

Forest Legacy

Amended Assessment of Needs

State of Hawaii



Photograph by Steve Bergfeld

December 2004

Assessment Of Needs Amendment Preface

For a decade, the State of Hawaii, through the Department of Lands & Natural Resources Forestry & Wildlife Division (DLNR), has participated in the federal Forest Legacy Program. This program is an important tool in a state where forests cover nearly half of our total land area, and provide our isolated island chain its most precious resource - fresh water. Hawai'i's tropical forests (the only such forests in the fifty United States) have also suffered dearly from clearing, grazing, development and increasingly the invasion of alien species that threaten the quality of our watersheds. Even still, Hawai'i forests continue to provide habitat for a large number of rare and endangered plant and animal species, cultural resources, and forest products that help diversify Hawai'i's economy.

The purpose of the Forest Legacy program is to protect environmentally and culturally important forestlands from conversion. Our 1994 Assessment of Need (AON) documenting forested areas, natural resources, and land use trends identified two small Forest Legacy Areas (FLA) that "tested" the program's effectiveness in Hawai'i. Successful projects have occurred in these areas, and the original AON has served us well as a guiding document.

However, in the past ten years there have been many changes to our environment, as well as social, political, and policy changes. Due to the success of this program in the original two FLA's, the inconsistent emergence of proposals coming from property owners within these small areas, and increasing interest in the program from private property forest owners in other important forest areas throughout the State, the DLNR and the Hawaii Forest Stewardship Advisory Committee have administered a review of the AON and propose the following amendments to address these concerns. We believe that these amendments will increase competition, generate stronger proposals, and increase our effectiveness at protecting our precious forest resources without missing key opportunities.

The central purpose of this amended AON is to articulate a change in eligibility criteria used to identify FLA's in Hawai'i, and utilize recent GIS technology to better map these areas. We are also demonstrating our commitment to the Forest Legacy Program and making this program more effective and efficient in Hawai'i by taking the State Grant Option. This updated AON provides details of how the State will take on the new responsibilities required with this option.

Because this is a significant amendment to the 1994 AON, this updated version requires approval by the Chief of the Forest Service (or designee) before the program changes can go into effect, and we eagerly await this approval.

We are proud of the partnership work we have accomplished over the past ten years with the United States Forest Service to protect forestlands and watersheds with the Forest Legacy Program. We hope that you share our view that this amended AON will help reinforce and guide our purpose: to conserve and ensure the sustainable management of Hawaii's forestlands for future generations.

Paul Conry, Administrator
State of Hawai'i Department of Land & Natural Resources
Division of Forestry & Wildlife

Date

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Chapter 1

INTRODUCTION

1-1. Hawaiian Islands

The Hawaiian Islands are located more than 2000 miles from the closest continental land mass. Seventy million years of isolation, and habitats ranging from alpine deserts to tropical rain forests and coastal dunes, have produced more than 10,000 species of plants and animals found nowhere else on earth. Approximately 88% of the species which inhabit Hawai'i's forests and coastal ecosystems are endemic. In addition, Hawai'i has the only tropical rain forests in the 50 United States.

Tragically, Hawai'i also has more threatened and endangered species than any other state in the country, and there is increasing pressure to develop what little remains of the State's natural areas and resources. Nearly two-thirds of Hawai'i's original forest cover, and many associated plant and animal species have been converted to agricultural and urban uses. It is estimated that up to 50 percent of Hawai'i's native species are extinct or in danger of extinction. Twenty-seven percent of the nation's total or almost 900 different species of Hawaiian plants are being considered for threatened or endangered status.

The survival of many of Hawai'i's remaining native species and ecosystems depends upon the conservation and improved management of its remaining forest lands. Hawai'i's forests also yield an array of products and services upon which both its traditional and modern human cultures depend, including clean water, wood products, plant materials and recreational opportunities such as hunting.

The Forest Legacy Program provides Hawai'i with an alternative, proactive forest conservation strategy. Private landowners must be provided with appropriate information, incentives and – sometimes – financial means, if they are to actively manage and conserve their forest resources.

In 1994, the State of Hawai'i completed its original Assessment of Need (AON) and introduced the federal Forest Legacy Program to Hawai'i. In that 1994 document, the State of Hawai'i identified many thousands of forestland acres throughout the Island chain as “Environmentally Important” and “Threatened” that would benefit from the Legacy Program.

In order to test the program and its effectiveness in Hawai'i, the 1994 AON carved out two small Forest Legacy Areas from this larger body of eligible land throughout the state. These two small FLA's on the Island of Hawai'i would introduce the program to Hawai'i's landowners and the public at large and were an immediate priority for

protection within the State. These “immediate target area” FLA’s of South Kona and Kohala served critical watershed functions and were “the most immediately threatened by conversion to non-forest uses” relative to the other “eligible” lands throughout other Islands.

1-2. Reasons for 2004 Amended Assessment of Need

Now, ten years later, after several successful Forest Legacy projects in the original test Forest Legacy Areas, the State of Hawai’i Forest Stewardship Committee (FSC) seeks to build on this success and expand the Legacy program throughout the State – encompassing much of the land considered “eligible” in 1994 but not established as official Forest Legacy Areas. In the past several years, applications from the small test FLA’s have been less consistent, while threats to other forest areas in Hawai’i have grown, and landowners outside the current, limited FLA’s are demonstrating strong interest in participating in the Forest Legacy Program.

In this 2004 Amended AON, the Hawai’i FSC has utilized new, consistent criteria statewide to define Forest Legacy Areas for each island. New GIS technology and multiple criteria allow for important forestlands throughout the Islands to gain eligibility for the Legacy Program, making Forest Legacy stronger, fairer, more competitive, and we hope even more successful for the next decade. The Hawai’i FSC believes that the expansion of the Hawai’i FLA’s is a “significant amendment” and have handled this 2004 amendment process to the AON as a “significant amendment” under the 2003 Forest Legacy guidelines.

In summary, this Amended AON is more inclusive and the eligibility criteria more consistent throughout the State of Hawai’i. The 1994 AON relied heavily on the 1992 State Land Use District Boundary Review process to identify several large geographic areas throughout the state that contained “important natural resources.” These lands served as the pool from which the two FLA’s (South Kona and Kohala) would be drawn as test areas for the Legacy Program. For this 2004 Amended AON, the Hawai’i FSC has utilized four new Forest Legacy Eligibility Criteria that include the “eligible” areas identified in 1994, as well as the current FLA’s. Consistent with the findings of the 1994 AON, these areas are now highlighted as “areas of emphasis” within the Forest Legacy Areas throughout the State or one FLA per island.

The four Eligibility Criteria contain databases that cover the entire state, identify important forest resources, utilize GIS technology, and are already familiar to private landowners and the public in Hawai’i. These criteria are: 1) Prime Forest Lands in Hawai’i; 2) Lands within the Conservation State Land Use Area; 3) Critical Habitat Lands; and, 4) Public and Private Watershed Partnerships.

Finally, the State of Hawai'i is demonstrating its commitment and dedication to the success and expansion of the Forest Legacy Program in Hawai'i by taking the state grant option in 2004. With the state option in place, and the approval of the following amended "Assessment of Need" enabling an expanded State Forest Legacy Program, the Legacy program will help the State, public at large, and private landowners have maximum flexibility to protect important forest lands in Hawai'i.

1-3. Goals of the Forest Legacy Program in Hawaii

The Hawai'i State Forest Stewardship Committee has broadened this 1994 mandate to create Goals and Objectives for the Forest Legacy Program's work in this 2004 AON. The FSC has established the following general goals for the Program to be utilized in Hawai'i:

- 1) Protect Hawai'i's unique and fragile environmental resources
- 2) Encourage the protection of rare and/or endangered species
- 3) Promote the preservation of aesthetic beauty in Hawai'i
- 4) Preserve watershed health and protect the sustainable yield of fresh water
- 5) Protect working forests as economic assets for the state and counties of Hawai'i
- 6) Protect traditional and cultural forest practices and resources
- 7) Protect recreational forest practices

Chapter 2

HISTORY AND FOREST RESOURCES

2-1. Hawai'i's Forests: A Historical Perspective

The Polynesians found a unique and diverse native forest when they arrived to the Hawaiian Islands more than 1,000 years ago. These early settlers cleared most of the lowland forests for agriculture and dwellings, but they left the upland forests relatively undisturbed. The European settlers, who arrived in 1778, introduced a number of practices and species that dramatically altered or destroyed much of Hawai'i's upland native forest lands. With King Kamehameha The First's consent, Captain Vancouver released cattle, sheep, horses, goats and European pigs into Hawai'i's forests. This introduction of large ungulates set the stage for contemporary forestry in the State.

Many of Hawai'i's major watersheds were badly degraded 100 years after the introduction of ungulates and reclaiming them was an economic imperative. Forest watershed stabilization and enhancement was essential in creating a sugar production industry and thus a rural economy. The Hawai'i Sugar Planters Association, a private, not-for-profit sugar industry association, was active in developing watershed protection efforts in Hawai'i, especially reforestation activities. The Territory undertook a number of major reforestation and feral animal traffic control efforts during the period from 1919 to 1930.

The supply of water for agricultural and urban development has long been recognized as the most important forest product. The most widespread and initially successful effort to secure adequate and reliable water supplies on a long-term basis was the placement of large forest watershed areas into State Forest Reserves. Both territorial and private lands were enlisted and a tax-free status provided private landowners with sufficient incentive to conserve their forests, in exchange for some government control.

After World War II, however, different concepts and practices supplanted the traditional views of watershed Forest Reserves, and a significant decline in Forest Reserve acreage and stewardship occurred as conflicting goals were accommodated. Changing times and regulations diminished incentives to private landowners for maintaining their lands as Forest Reserves. On the Big Island, 98% of the private enlistments were withdrawn between 1946 and 1975.

In recent years, economics has driven the scattered clearing of undervalued native watershed forests for house-lots, pasture, timber and croplands. The few remaining

stands of lowland forest are small, scattered and often highly degraded. Most are in the agricultural district. Grazing and browsing by feral ungulates has degraded remnant native forests at higher elevations. The upper elevation koa (*Acacia koa*) forests on the island of Hawai'i have been reduced by clearing to create pasture, a land use which receives an agricultural tax designation, and is taxed at among the lowest rates. Demand for koa, a highly valued native hardwood, has nearly depleted the supply of quality old growth on private lands. Koa's scarcity is reflected in its stumpage price, which has increased ten-fold during the last decade.

A number of recent administrative actions, programs and regulations have attempted to supplement or partially replace the Forest Reserve system and reverse the conversion of Hawai'i's remaining forests. In 1961, a greenbelt law established two new land-use categories: Urban and Agriculture Districts, and included the existing Forest Reserves, along with other lands, in Conservation Districts. The act reflected a growing awareness that the limited natural resources of Hawai'i must be conserved. In 1982, recognition that both plants and animals should be managed as interdependent resources led the wildlife branch of the former Division of Fish and Game, Department of Land and Natural Resources (DLNR), to join forces with the Division of Forestry and form the only State Division of Forestry and Wildlife (DLNR-DOFAW) in the nation. Today, DLNR-DOFAW manages roughly 800,000 of Hawai'i's remaining 1.7 million acres of forest land. The Division attempts to protect and improve private forest lands through the provision of incentive programs such as Forest Stewardship and Tree Farms.

Although the USDA Forest Service has no National Forest in Hawai'i, through the Institute of Pacific Islands Forestry it provides grants, aids private forest landowners and others through the FLEP program, and provides technical assistance and research services to DLNR-DOFAW.

Existing measures to conserve Hawai'i's remaining forests are discussed in further detail in Chapter 5.

2-2. A Natural History: Geology, Climate and Soils

An appreciation for Hawai'i's diverse and unique forest resources requires some understanding of the natural processes that produced them.

The Hawaiian islands are a chain of exposed basaltic domes formed by lava outpourings along a 1,600 mile long fissure in floor of the Pacific Ocean. Approximately one-sixth of Hawai'i's land area is covered with relatively new volcanic earth--lava and cinders.

The topography of all of the islands reflects volcanic activity. Where volcanic flows have occurred recently, such as on the southern section of the island of Hawai`i, the terrain is un-dissected and quite barren, revealing large areas of exposed lava. Where lava flows have not occurred for some time, the terrain has been eroded by rivers and streams. The once smooth volcanic domes of Kauai and Oahu are now deeply dissected. Geologically, Kauai is the oldest of the main islands and thus has the greatest abundance of scenic sheer cliffs (*pali* land) that are formed by millions of years of intense chemical weathering and erosion. In contrast, the predominant surfaces of east Maui and the island of Hawai`i still resemble domes.

The island of Hawai`i is the largest and youngest island in the chain. It was built from the ocean floor by outpourings of lava from five volcanoes--Kohala, Mauna Kea, Hualalai, Mauna Loa and Kilauea. Mauna Kea, the highest mountain, reaches 13,784 feet above sea level. It is built up of olivine basalt and covered with layers of volcanic ash. Mauna Loa covers an area of 2,035 square miles or 50 percent of the island. It is 13,680 feet high and last erupted in 1984.

Island topography is also a product of the surrounding ocean. Wave actions have eroded the basic rock and formed high sea cliffs along the windward coasts of all islands. Along the leeward coasts, where there is less wind, tidal and wave action, cliffs are generally lower and there are more bays and sandy beaches.

Hawai`i's topography creates a multitude of diverse microclimates. The open sea around the island chain receives between 25 and 30 inches of rain during the average year. Individual islands receive more than 10 times this amount in some places and less than half in others. The principle source of this extreme variability--and the highest annual rainfall totals on earth--is the moist trade wind air that ascends and traverses topographic barriers on most days of the year. On lower mountains, the mean distribution of these orographic rains follows elevation contours. Rainfall totals are greatest over windward slopes and crests and least over leeward lowlands. Widespread heavy rains are also brought by winter storms, but these rains are not as affected by topography as are the rains brought by moist trades.

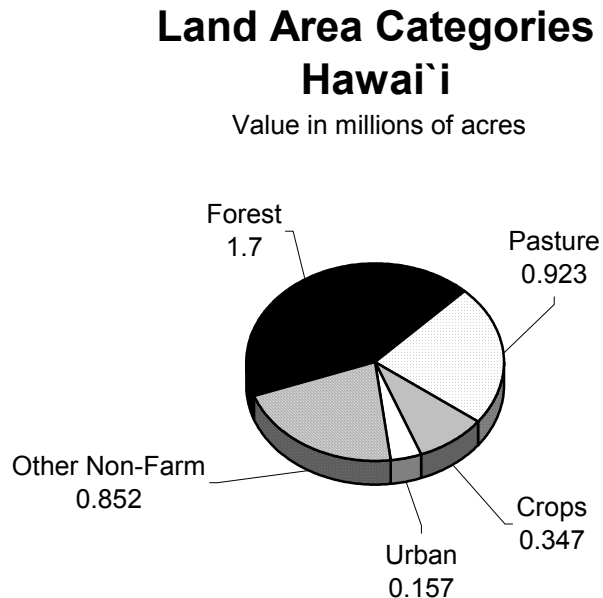
Extreme drought occurs when winter storms or trade winds fail. The probability of serious drought somewhere on the island of Hawai`i during any given 10-year period exceeds 90 percent. Areas like Kohala and Hamakua on the island of Hawai`i, although in the 100 to 200 inch per year rainfall zone, are particularly vulnerable.

The Kona District has the State's only major diurnal wind system. Its pronounced summer rainfall maximum is attributable to daytime on-shore winds that ascend the leeward slopes of Mauna Loa and Hualalai and produce much of the area's cloud drop and rainfall.

As in most of the tropics, the weathering processes that transform Hawai'i's lava flows into soil are primarily chemical as opposed to mechanical, and thus driven by moisture and heat. Soil parent material is mostly basaltic--about 50 percent silica. Andesitic rocks, volcanic ash and cinders occur in a few places. Most of Hawai'i's soils are initially very porous, friable and well-drained. As they age, they increase in thickness, become lateritic, and lose their porosity. Otherwise, Hawaiian soils are not at all homogeneous. They are formed from parent materials that vary greatly in geological age in a wide range of local micro-climates from wet-tropical to subalpine to desert.

2-3. Forest Coverage and Composition

Hawai'i's natural forests are largely products of its soils and climates and thus each of its major islands supports a wide variety of forest types, ranging from low elevation tropical rain forests to arid scrub forests to temperate subalpine woodlands to cloud forests. The most recent available data indicate that forests still cover roughly 1.7 of Hawai'i's 4.1 million acres--about 41 percent of the State's total land area. Approximately 60 percent of this area is considered productive, healthy forest--mostly covered by ohia (*Metrosideros polymorpha*), ohia-koa mix and relatively pure koa. For comparison, other land-use category acreages are illustrated below.



About 700,000 acres--or roughly 50 percent--of the relatively productive forest land is considered to be timberland--capable of producing timber and wood products on a sustainable basis (Department of Land and Natural Resources 1981). Most of this prime forest land--approximately 470,000 acres--is on the island of Hawai'i. Only a

small portion--roughly 48,000 acres is currently used for plantation forestry. Existing plantations consist largely of exotic eucalyptus (*Eucalyptus* spp.). More than one third of this total plantation acreage is on the island of Hawai`i.

Most of the remaining upland forests that were historically protected and managed as part of the Forest Reserve System previously discussed in section II are on the island of Hawai`i. These forests and their shrub lands are generally dominated by koa (*Acacia koa*) and ohia (*Metrosideros* spp.), with mamane (*Sophora chrysophylla*) and naio (*Myoporum sandwicense*) appearing at higher elevations. Where degraded, as by frequent wildfires or overgrazing, invasive weeds such as koa haole (*Leucaena leucocephala*) and kiawe (*Prosopis pallida*) have taken over.

Detailed data on the composition of more natural forest areas by type and species do not yet exist for all the islands. In general, there are 4 native and 5 introduced forest cover types in Hawai`i as follows:

native forest types

- > ohia/hapuu
- > koa/ohia
- > mamane/naio
- > mixed dry land

introduced forest types

- > eucalyptus
- > mixed hardwood
- > guava/christmas berry
- > kiawe/leucaena/monkey pod
- > conifer

DLNR-DOFAW is currently conducting a multi-resource inventory of the State in collaboration with the US Forest Service. A major objective of this inventory is to create a network of permanent plots throughout the State that will provide information on tree growth and mortality--and forest trends. It extends beyond the traditional timber volume inventory to address other important issues such as watershed protection, noxious weeds, feral animal impact and the protection of native Hawaiian forests. To date, multi-resource inventories have been completed only for the islands of Kauai (Buck 1988), Oahu (Buck 1988) and Molokai (Buck 1986). Important data for each of these islands is summarized in tabular form on the next page.

Although apparently the dominant landscape type, much of Hawai`i's forest land (about one-fifth) is relatively unproductive scrub and much of its potentially productive natural forest land is seriously degraded. Forest scrub occurs in the rain shadows on the leeward sides of mountain peaks and on the highlands above rain clouds, which typically form between the 2,000 and 5,000 foot levels.

| |
|-------------|
| Oahu |
|-------------|

| | |
|-------------------|------------------------|
| Forested | 134,358 acres |
| Forest Reserve | 25,591 acres |
| Major Forest | |
| Types | Ohi/Koa (66,111 acres) |
| Plantation Forest | 10,918 acres |
| Timberland | 27,400 acres |
| Pali Land | 36,200 acres |

| |
|--------------|
| Kauai |
|--------------|

| | |
|-------------------|----------------------|
| Forested | 188,500 acres |
| Forest Reserve | 88,000 acres |
| Major Forest | |
| Types | Ohia (109,000 acres) |
| Plantation Forest | 5,900 acres |
| Timberland | 37,200 acres |
| Pali Land | 36,200 acres |

| |
|----------------|
| Molokai |
|----------------|

| | |
|-------------------|-------------------------------|
| Forested | 57,598 acres |
| Forest Reserve | 44,287 acres |
| Major Forest | |
| Types | Ohia and Kiawe (66,048 acres) |
| Plantation Forest | 2,411 acres |
| Timberland | 23,494 acres |

Virtually all of Hawai'i's native forests have been affected and/or degraded to some degree, and the causal exotic/imported agents that began to arrive 200 years ago continue to multiply. Having evolved in total isolation, Hawaiian flora have developed no defenses against cattle, sheep, goats, pigs and other vegetation-eating mammals. Introduced grasses, forbs, herbs, shrubs and trees have quickly become aggressive weeds, establishing themselves in forest clearings and preventing the regeneration desirable forest tree species. Large areas of pasture and grazed forests are covered by dead and senescent forests unable to regenerate themselves.

In addition, an unknown combination of diseases and pests continues to contribute to the decline of Hawai'i's forest ecosystems. Species die-backs are visible in many forest areas. These include koa and uluhe (false staghorn fern, *Dicranopteris linear*) on Oahu, mamane on Hawai'i, and ohia on all islands. Typically, trees exhibit a rapid loss of all foliage or a slow loss from top to downward. Ohia decline is observed throughout a 200,000 acre area on the island of Hawai'i.

2-4. Forest Plantations

Most existing forest plantations were established early this century for soil and water conservation purposes. These consist primarily of high-quality exotic hardwoods and introduced eucalyptus species. The net volume of growing stock in these forests was estimated to be 280 million cubic feet in 1987 (Department of Business, Economic Development and Tourism 1993). Only four million cubic feet of this was in softwood production.

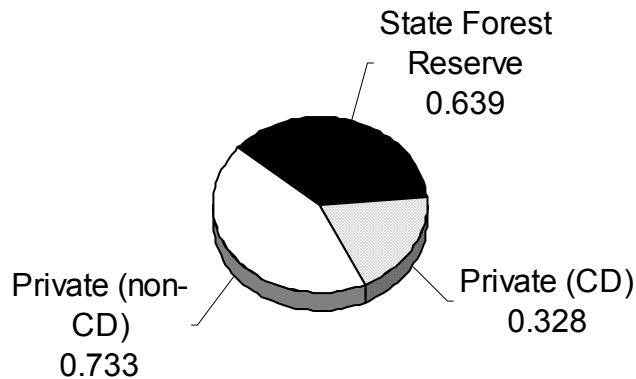
Several experimental plantations--mostly of various eucalyptus species have more recently been established for fuelwood chip production--a potential alternative to oil-burning for electrical power generation. Unfortunately, economic analysis indicates that a higher profit can be earned by exporting these chips rather than using them locally. Wood-chips are also being considered for local composite wood manufacture. There are currently no commercial wood-chip producing plantations.

Although few in comparison, some plantations have been established to restore areas of native forest. Native koa is being established for bird habitat in the Hakalau Wildlife Refuge on the island of Hawai'i. Some private landowners are planting koa for purposes of restoration and eventual income generation--many with assistance from government cost-share programs such as Forest Stewardship. It remains to be seen whether or not closely planted stands of koa--or other native trees--can provide the environmental services that natural native forests have.

2-5. Forest Ownership and Control

Although small in total area, Hawai'i has the eighth largest State-owned forest and natural area reserve system in the United States. Fifty-seven percent of the State's forests--or 967,143 acres--are within the State Conservation District, and thus to some degree "protected". Of this area, 639,298 acres are within State-owned Forest Reserves. The remainder is privately-owned. The Conservation District is one of four land use zones established in Hawai'i in 1961. Conservation lands are under the regulatory control of the Department of Land and Natural Resources and are divided into four sub-zones: *protected*, *limited*, *resource* and *general*. The *protected* and *limited* sub-zones are the most restrictive; the *resources* and *general* sub-zones provide for sustained use of natural resources with proper management.

Hawaii Forest Land Ownership and Control



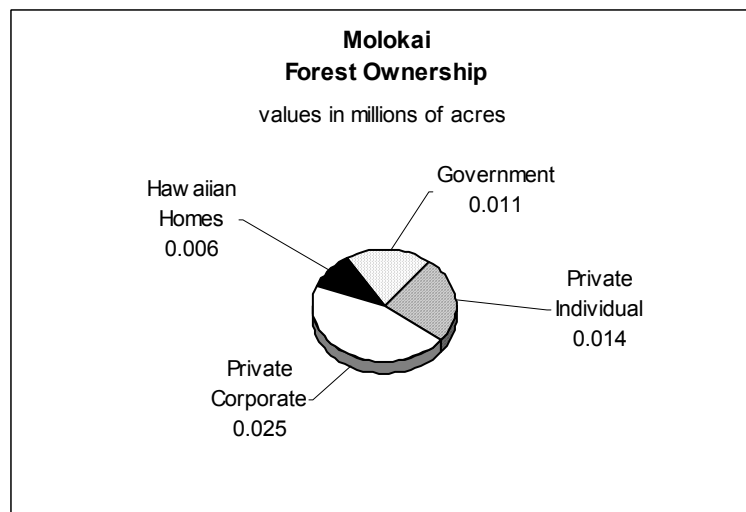
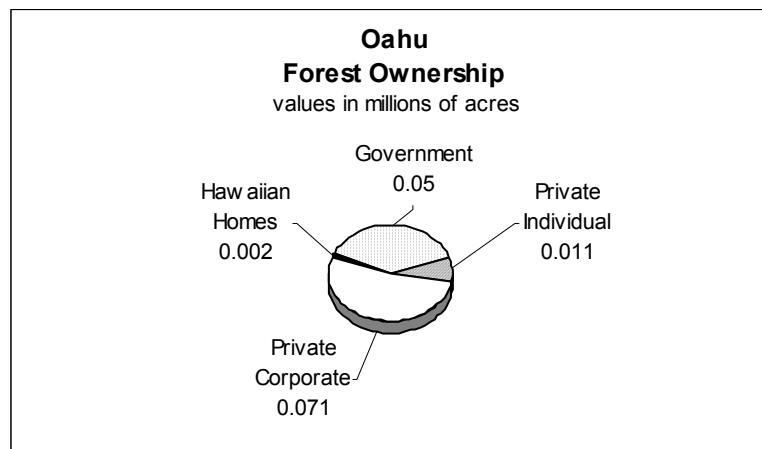
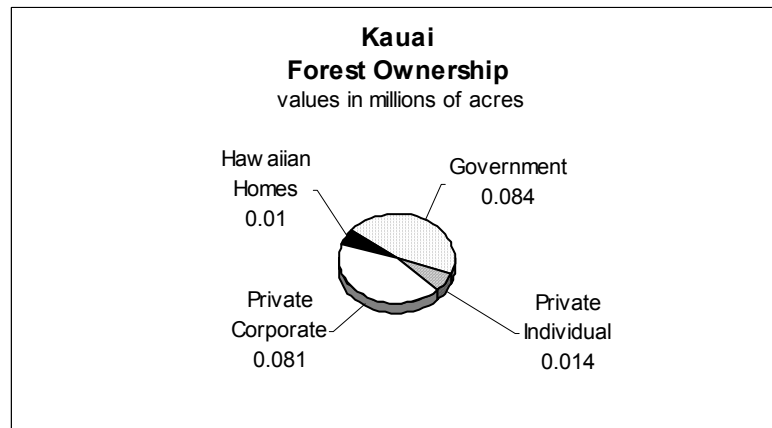
Approximately 730,000 acres of Hawaii's forests are privately owned and outside of the existing Conservation District.

*Approximately 730,000 acres of Hawai'i's forests
are privately owned and outside of the
existing Conservation District*

Of the 700,000 of forest land in the State capable of producing timber, 338,000 are State owned and 362,000 are privately owned.

From September 1990 through January 1991, the Office of State Planning conducted a series of Native Ecosystems and Rare Species Workshops with the assistance of the Nature Conservancy of Hawai'i (The Nature Conservancy of Hawai'i 1991). The workshops focused on identifying biologically significant areas that are not currently located within the State Conservation District. Of the 121 privately owned sites identified, 55 include native upland forests. Most of these are on the island of Hawai'i.

Multi-resource inventories carried out on the islands of Kauai, Oahu and Molokai yielded the following forest ownership data:



It is interesting to note that, in 1991, approximately thirty-six percent--or 905,484 acres--of Hawai'i's total land area is owned by six major landowners (Department of Business, Economic Development and Tourism 1992).

2-6. Recent Trends

Although Hawai'i's forests are largely degraded, recent economic trends are causing many to recognize their potential value. A number of market-driven factors have spawned a wide-spread interest in forest plantation establishment. Most noted among these factors are the potential increased availability of land for forestry due to sugar plantation closures and the high--and ever rising--price of quality hardwood timber such as native koa. Forty-two percent of the land area on the island of Hawai'i is considered to be existing prime and unique forestland or have prime and unique forest land potential. Fallow sugar cane and pasture brush lands currently cover twenty-seven percent of prime and fifteen percent of unique forestlands (Prime Forest Lands Inventory 1981).

Chapter 3

HAWAII FOREST USES AND VALUES

Hawaii's remaining forests provide a multitude of important services and benefits. Most notably, they enhance and protect watersheds that are critical to all island inhabitants. Hawaii's forests are also major cultural resources, not only holding vast archeological sites and sacred areas, but also providing resources for hunting, gathering, and traditional practices that help keep Native Hawaiian culture thriving in current society. Forests also provide an array of wood and non-wood products, unique habitat for rare and endangered species, and a number of recreational opportunities. In addition, Hawaii, with the only tropical rainforest in the United States, and with its wide range of climates, could potentially serve as a microcosm for global tropical forest research and demonstration.

3-1. Watersheds

Hawaii's forests serve as the State's main freshwater recharge area. The protection of the forests as a water resource is essential to Hawaii's livelihood. The availability of freshwater is the primary determinant in defining the carrying capacity of the islands for humans, plants and animals. Forests intercept rainfall, and allow it to slowly percolate into groundwater aquifers and freshwater streams.

The quality and storage of fresh water in Hawaii's aquifers are directly dependent upon well-managed forests. Forests require few chemical inputs when compared to crops and pasture. They trap and filter sediment. Forests also shed huge quantities of organic matter, which improves soil structure and water holding capacity.

Hawaii's freshwater streams-fed by forest watersheds-have a multitude of values. They provide irreplaceable habitat for rare aquatic and riparian flora and fauna. Streams also link the mountains with the sea and surrounding forest cover is required to maintain the quality and productivity of near-shore marine waters. Forests protect fragile soils from erosion and, in turn, prevent siltation of streams and offshore reefs. The health of Hawaii's near-shore ocean fisheries is directly linked to the health of its forests.

Hawaii has about 200 miles of freshwater streams capable of sustaining fish life, both native and introduced. There are five species of endemic fish known as "o'opu". Ongoing research supported by the Department of Land and Natural Resources Division of Aquatic Resources indicates that Hawaii's island stream ecosystems function differently than aquatic ecosystems in continental situations (Department of Land and Natural Resources 1992). They are simpler in structure and absolutely dependent upon runoff from "relatively natural areas". They lack features that

elsewhere help to stabilize ecosystems when upsets occur. The "ridge to ridge" forest watershed protection approach would help stabilize these ecosystems and offer native species the greatest chance of survival. However, ridge to ridge Conservation District protection is in most areas not currently possible due to existing land use boundaries and activities. The Office of State Planning recommends establishing Conservation District corridors along special streams (The Office of State Planning 1992b).

An important but often overlooked source of fresh water is that intercepted directly from passing clouds by forest vegetation and soils whose elevation of about 2,500 feet or more places them in the "cloud belt". In some areas, the annual catch of this "fog drip" is believed to equal that of rainfall. "Fog drip" studies have shown that passing cloud moisture otherwise lost in deforested areas can be captured for recharge by reforestation.

Today, Hawai'i's forest resources and watersheds are in fair to good hydrologic condition. This was not the case in the early part of this century, when uncontrolled grazing and forest clearing had significantly reduced forest cover, and thus water recharge potential. Management measures, reforestation, fencing and animal control strategies attempted to prevent further degradation and restore forest recharge capabilities. Since the early 1900's, approximately 55,000 acres of land have been reforested and rehabilitated.

3-2. Timber/Wood Products

Although almost half of the State's forest land is capable of producing wood products on a sustainable basis, Hawai'i's forest products industry remains small by U.S. mainland standards. There are approximately 48,000 acres of tree plantations in existence throughout the State. Most timber harvesting currently takes place as "salvage" operations on lands being converted to non-forest uses or from senescent stands of valuable koa.

The latest figures available (1987) place 700,000 acres in total timberland area. Of this 338,000 acres are State or County owned and 362,000 are private land. On this land there is an estimated saw-timber volume of 1,196 million board feet (only 18 million of which are softwood) and a net growing stock volume of 280 million board feet (4 million of it softwood)(Department of Business, Economic Development and Tourism 1993a).

In 1992, the University of Hawai'i conducted a study commissioned by the Governor's Agricultural Coordinating Committee to survey three major segments of Hawai'i's forest industry: hardwood crafts-people and artists, major landowners and construction contractors. The survey revealed that the value of the industry is much

greater than is commonly assumed by policy makers and the public--roughly \$29 million/annum--and that domestic lumber consumption averages more than 100 million board feet per year.

Further growth of Hawai'i's forest industry is hindered by a number of factors. The State's most valued and known timber--koa--is in scarce supply on private lands. There is still a significant koa resource on public lands but it is not available for harvesting due to its value as a component of native ecosystems and a public perception that timber harvesting is incompatible with ecosystem management. To meet immediate industry needs, the Hawai'i Forest Industry Association is working to increase market demand for wood from mature plantations of exotic hardwoods.

The perceived omnipresence of rare, threatened and endangered species and the public's perception of forestry as a threat to these species combine to create the greatest challenge to industry progress and growth. Compliance with environmental laws and public concerns, precludes the participation of many who fear that regulation will either render their proposed operation economically infeasible--or prevent them from harvesting their timber after years of invested labor and capital. The State legislature recently passed a "Right to Harvest" bill which provides a basis for compensation should environmental laws preclude harvest in certain timber production ventures.

Another set of recently emerging factors has resulted in a growing recognition of timber production as a potentially large and viable Hawai'i industry. Most obvious and immediate is the demise of the State's once lucrative sugar and pineapple industries. Sugar industry shutdowns translate into a substantial loss of jobs and income--and an immediate uncertainty over what could possibly replace sugar as a major industry in the State. While diversified agriculture is being considered, competition from other world producers of macadamia nuts, cut flowers and coffee threatens to lower corresponding international market prices just as it has with sugar and pineapple. As the supply of these products in the world market continues to increase prices will inevitably fall to levels below Hawai'i's relatively high costs of production.

Sugar industry shutdowns will open up large areas for alternative land uses. Total land area in sugar cane production decreased from 229,611 in 1972 to just 155,608 acres in 1991 (Department of Business, Economic Development and Tourism 1993a). In 1991, pineapple cultivation ceased on the island of Lanai, leaving 10,000 hectares idle. In 1992, the 20,000 hectares of sugar plantation on the island of Hawai'i were put into production for one final harvest. The Hamakua Sugar Company, the second largest sugar producer in the State, declared bankruptcy in March of 1993. The increased availability of land for forestry represents a "window of opportunity" for the industry. Most of these lands, both private and State-leased, are characterized by

soils and rainfall patterns that are ideal for silviculture. It is not likely that sugar will be replaced with another agricultural crop that requires substantial annual labor expenditure and is subject to world market price fluctuations.

Policy makers and planners are increasingly interested in the potential of timber production as a major State industry. The State's representatives to the U.S. Congress have become more aware of forest issues and supported Hawaiian forestry for increased national funding. The Department of Business, Economic Development and Tourism (DBEDT) recognizes the long term potential of forestry, as a possible replacement for State revenues once earned through sugar production, and has already solicited forestry development proposals from DLNR-DOFAW.

The expansion and development of the forestry industry and its products is also encouraged by recent reports and studies that illustrate the industry's economic and technical feasibility. Due to the favorable growing conditions in Hawai'i, forest productivity is significantly higher than the average national standard based on wood producing capability. New information on koa growth rates indicates that commercial thinning will be possible within 30 years of planting. In addition, the ever-rising price of koa wood is drawing the attention of landowners who formerly did not consider forestry to be a viable alternative land-use. In Fall of 2004, Koa wood currently sells for approximately \$14 per finished board foot.

The market for wood products in Hawai'i, and throughout the Western Pacific continues to grow. Hawai'i is an island State from which a heavy commodity like wood products can conveniently be transported by ship to all countries bordering the Pacific Ocean waterway, but in particular those in Pacific Asia where demand is greatest. Hawai'i's lumber consumption averages about 100 million board feet per year. About 90 percent of this is softwood for construction needs and 10 percent is quality hardwood for furniture, paneling and cabinet work. Virtually all of this lumber is currently imported from the mainland and abroad.

3-3. Cultural Resources

Hawaiian cultural traditions reflect a close and long-standing relationship with the island's landscape, native species and ecological processes. The survival of Hawai'i's native forest plants and animals is necessary if many of the cultural traditions of its indigenous people are to continue. Many forest trees and plants provide traditional products and services.

Koa which means "warrior" in Hawaiian, is one of the most culturally valued trees in the Hawaiian islands. Koa was the principal tree used for canoes by Hawaiians who also used the hard wood to make house timbers, spears, paddles and bowls. It is today, the premier Hawaiian timber for furniture cabinetry, interior woodwork and

woodcraft. Koa is found throughout the islands and is second only to ohia (*Metrosideros* spp.) in abundance in natural forests. Although now found only in the highlands, it once ranged widely in lowland areas.

Koai'a (*Acacia koaia*) is a close relative of koa, found in drier, lower areas. It is used by Hawaiians for paddles, spears and shark hooks. Many consider koai'a endangered as it is now found only in small areas on the islands of Molokai, Maui, Lanai and Hawai'i.

Native wiliwili (*Erythrina sandwicensis*) has a light, corky wood historically used to construct canoe outriggers, surfboards and fishnet floats. Its shiny red seeds have long been strung onto Hawaiian leis. This tree was once quite common within lower elevation forests throughout the island, but today is out-competed by the introduced kiawe (*Prosopis pallida*).

Mamane (*Sophora chrysophylla*) is a native tree of drier upland forests. It is common now only on the islands of Hawai'i and Maui. Mamane wood is hard and tough. It is traditionally used to construct houses, spades, tool handles and sled runners.

Maile (*Alyxia olivaeformis*) is a favorite native forest understory plant. The fragrant bark of its stems and the fragrant, oval, pointed, shiny leaves are indispensable at times of celebration for decorations and leis. The plant grows as a straggling or twining shrub in native forests of the lower and middle mountain regions. The supply of maile does not meet current demand and there is concern that continued harvesting will soon threaten its existence.

The forest floor yields many other specialty forest products that local people gather and use for leis, floral arrangements and landscaping purposes. Examples are tree ferns, native palms, and ti leaves. It is strongly suspected that the extraction and sale of these minor forest products contributes substantially to local economies throughout the State.

Hawai'i's forests are also known to contain a number of cultural heritage resources--historical sites which include places, structures and objects. To date, only about five to ten percent of the State has been inventoried for such historic sites and little of this inventory has been carried out in forested areas. Since written records exist for only the last 200 years of Hawai'i's history, cultural heritage resources are essential to the reconstruction of earlier history. Much of the history of early Polynesian settlement of the islands may lie in yet to be identified, or yet to be discovered archaeological sites, many of which are likely to be found within forest environments. DLNR-DOFAW is currently working with the State Office of Historical Preservation to identify all possible cultural heritage resources in eligible Forest Legacy areas.

A traditional Hawaiian land division, the ahupua'a (literally, pig altar) is a reasonably reliable indicator of where certain cultural resources are likely to be found according to island topography and watershed boundaries. This traditional land division extended--in a typically triangular shape--from the highest ridge of a watershed, along a set of valley sides, to the ocean. Essentially, these divisions encompassed single watersheds and contained all land uses necessary to sustain life and culture in a typical Hawaiian settlement. Archeological finds to date and existing records indicate that intensive land uses and settlement structures were limited to lowland areas close to the coast. Upland areas were left as forests and were used primarily for hunting and gathering purposes, and for burial sites. Several burial sites have been identified in Hawai'i's remaining upland forest areas and are the primary cultural heritage resource type contained therein.

3-4. Wildlife: Threatened and Endangered Species

The State of Hawai'i is home to 25 percent of the threatened and endangered species that inhabit the United States and approximately 75 percent of the country's species extinctions have occurred here (Office of State Planning 1992). Ninety percent of Hawai'i's native plants are endemic, 25 percent are at risk and 9 percent are now considered to be extinct.

From September 1990 through January 1991, the Office of State Planning conducted a series of Native Ecosystems and Rare Species Workshops with the assistance of the Nature Conservancy of Hawai'i (The Nature Conservancy of Hawai'i 1991). The workshops focused on identifying biologically significant areas--primarily wildlife habitats--that are currently located outside of the State Conservation District. A total of 121 sites were identified. Nearly one third of these sites are on the Island of Hawai'i (38) and the most common terrestrial resources identified were upland forests and shrub lands. Nearly all of these sites provide habitat for threatened and endangered plants and animals as well as more common native species. On Oahu, Kauai, Molokai and Lanai, most of the identified sites are lowland or coastal. On Hawai'i and Maui, most of the sites are native forests--many adjacent to existing forest reserves.

The major wildlife group dependent upon Hawai'i's forests is its unique forest bird population. Forty percent of North America's endangered bird species are from Hawai'i. Of the 40 species of forest birds found in Hawai'i, 21 are endemic and endangered. Forest birds pollinate native trees and consume insect pests. In addition they provide a source of pleasant recreation in a cool, green environment for an increasing number of bird watchers. The `alala or Hawaiian crow (*Corvus hawaiiensis*), Kauai akialoa and Kauai nukupuu are the most endangered. The endangered Palila (*Loxioides bailleui*) is particularly dependent on the native mamane tree.

There are also five species of native freshwater fish known as "oopu" which are all endangered. Ongoing research supported by the Department of Land and Natural Resources Division of Aquatic Resources indicates that Hawai'i's island stream ecosystems function differently than aquatic ecosystems in continental situations (Department of Land and Natural Resources 1992). They are simpler in structure and absolutely dependent upon runoff from "relatively natural areas". They lack features that elsewhere help to stabilize ecosystems when upsets occur.

The protection and perpetuation of forest bird habitat is assured to a limited extent because large areas of relatively undisturbed native forest are within the Forest Reserves. Without active management, however, the wildlife habitat function of many of these areas will decrease. In addition, survival of some species depends upon the ability and willingness of private landowners to conserve and manage essential, contiguous areas of habitat, and prevent alterations to the forest.

The major threat to native forest birds is forest habitat loss and degradation. This varies from the outright conversion of forests to pasture or subdivision use, to loss of habitat from feral animal activities, to more subtle alterations such as exotic plant invasion and competition. The ohia die-back phenomenon may be having a serious impact on forest birds in localized areas.

3-5. Aesthetic and Scenic Resources

Hawai'i's remaining forests provide unique aesthetic benefits for both residents and tourists. A relatively intact native forest commonly includes an overstory of koa and ohia--and an understory of tree fern, milo, mamane and a variety of multi-colored orchids and exotic gingers. The inherent beauty of such a typical tropical forest, often bordering on sheer cliffs, waterfalls, and public roadways is an obvious and prominent forest value.

3-6. Mineral Resource Potential

Like all volcanic islands, those of Hawai'i are relatively poor in minerals and there is no real developable potential in forest or other areas. Some minerals, however, including a few semi-precious gems, have been found. These most largely result from cooling magma, reactions between different components of magma, and reactions between magma and limestone. Minerals thus formed include olivine, augite, quartz, agates and jaspers and small deposits can be found scattered throughout the island chain. Most Hawaiian specimens are smaller, more poorly colored and of considerable less value than samples of these minerals from mainland sources.

3-7. Soil Productivity

Soil productivity on the Hawaiian islands is--in general--directly correlated with age and slope aspect. The most productive soils are found on the windward slopes of the oldest islands where ample rainfall combined with time, has sufficiently weathered ancient lava flows. Such areas are considered to be of "prime" forestry potential and they make up about 20 percent of Hawai'i's total land area. These areas are also more susceptible to soil erosion if disturbed or cleared of cover vegetation.

Volcanically active areas do not have mature soils. Instead, they have either lava or ash substrata characterized by low levels of nitrates. These soils are highly permeable and thus not nearly as susceptible to erosion as are the older, more weathered soils described above.

On the island of Hawai'i, the most productive soils are found on the windward slopes of Kohala and Mauna Kea. On Maui, the most productive soils are found on the windward slope of Haleakala.

3-8. Outstanding Geologic Features

Hawai'i's geologic features are the products of volcanic activity and weathering. The major islands are basaltic domes in various stages of dissection. Streams develop slowly after the extinction of a volcano because of the high permeability of basalt and its young soils. Because temperatures are uniformly high, and except on peaks, not below freezing, chemical weathering dominates over mechanical disintegration. Gradually thick lateritic soils form and reduce the porosity of mountain slopes and stream courses are able to develop. All streams are powerful agents of destruction because of the steep slopes and fractured condition of the rocks. In general, the northeastern slopes of the islands are incised by deeper canyons because of heavier rainfall as described in Chapter 2. Hawai'i's most noted geologic features are the massive volcanos that dominate the islands of Hawai'i and Maui.

Lava tubes and anchialine pools are geologic features unique to active or recently active volcanic islands. Lava tubes are essentially caves formed when surface lava cools to form a hard crust over the top of hot, still flowing lava. These features are found in many mauka forest areas. Anchialine pools are freshwater pools found scattered throughout exposed lava flows in low-lying coastal areas, primarily along the Kona coast.

The island of Hawai'i consists of five volcanos: Mauna Kea (13,784 feet), Mauna Loa (13,679 feet), Hualailai (8,251 feet), Kohala (5,505 feet) and Kilauea (4,040 feet). Hawai'i, except for the windward slope of Kohala, is little dissected. The only perennial streams are on the northeastern slopes of Mauna Kea and Kohala. The high

permeability of the fresh lavas on the other volcanos inhibits the development of permanent streams. Dense, lush forest covers the windward slopes of the older volcanos where rainfall is ample and soils are more developed and productive.

Maui, like Oahu, is composed of two volcanic domes. East Maui, or Haleakala Volcano (10,025 feet) is known for its gigantic summit depression of unusual shape. West Maui (5,788 feet) is known for its sheer cliffs (pali`s) and needle-shaped mountain formations. These pali`s dominate the geology of both Oahu and Kauai, the oldest of the major islands.

3-9. Recreation

Scenic resources such as lush green forests, vibrant coral reefs and crystal clear water are vital to the continued health and growth of Hawai`i's number one industry--tourism. Approximately 6,514,000 visitors stayed overnight or longer in Hawai`i during 1992, compared with 4,243,000 in 1982 and only 2,244,000 in 1972 (Department of Business, Economic Development and Tourism 1993a). Healthy forest watersheds are essential to the quality of Hawai`i's shoreline--its most popular visitor attraction.

DLNR-DOFAW is responsible for the management of forestry and recreation on State Forest Reserve lands, and administration of the Natural Area Reserves System, both of which provide numerous and diverse hiking, camping and nature study opportunities. The Natural Area Reserves System includes 19 reserves on five islands, encompassing 107,306 acres. These reserves protect thousands of species of plants and animals unique to Hawai`i, as well as mountain watersheds.

In 1988, the legislature created the Na Ala Hele (NAH) Trail and Access program (Chapter 198D HRS), administered by the Division of Forestry and Wildlife.

Primary goals of the NAH program are to:

Improve and maintain the conditions of all appropriate public trails and access roads to specific management standards and specifications, respond to the ancillary natural and cultural resource management issues associated with trail and access roads corridors, and manage multiple public and the increasing commercial recreational activities.

Research, document, and inventory all trails, regardless of jurisdiction, and when feasible, restore ancient and historic trails for managed public use.

Engage in efforts to resolve specific public access disputes and initiate planning and development efforts for trails or accesses that may be suitable for inclusion into NAH, comment on development that may affect trails and accesses, or provide NAH technical or developmental support to other organizations or agencies.

Trails and access roads are necessary management features that serve multiple functions:

- Facilitating search and rescue efforts
- Combating and controlling wildland fire as firebreaks and access ways
- Monitoring and removal of environmentally damaging plant and animal species
- Monitoring and restoration of native flora and fauna
- Conducting watershed resource management
- Experiencing and protecting cultural history through ancient and historic Hawaiian trails
- Recreational opportunities: hunting, hiking, bicycling, equestrian riding, off-road vehicle use
- Economic and ecotourism opportunities through guided commercial trail excursions

Ecotourism, particularly in forested watersheds, has become increasingly more lucrative, and has grown considerably in the past ten years. For example, there are currently 36 permitted and regulated trail and access road tour companies regulated through NAH and that use forested watersheds as the venue for their patrons. In FY04, NAH collected \$40,507 in fees from permitted trail tour operators. Revenues are applied back into trail eminence. Tours are limited per day to minimize any potential impacts to forested watersheds.

3-10. Public Hunting

Once done primarily for subsistence food, forest game hunting has become one of the most popular--and controversial--recreational activities in the State. Hunted game consists of non-native, feral animals and game birds including pig, sheep, deer, goats, turkey and pheasant. Some feel that introduced ungulates should be eliminated entirely from Hawai'i's forests because of their highly destructive behavior. Hunting has become a Hawaiian tradition, however, and hunting groups are fervent in their defense and maintenance of hunting areas. The State is attempting to use hunting as a more effective tool in controlling feral animal populations. State-owned hunting areas include: Game Management Areas, managed for sustained or maximum game yields; Forest Reserves, where hunting is permitted; and Natural Area Reserves, where a variety of methods in addition to hunting are used to reduce populations of non-native animals. This policy of different game management objectives for different areas is regularly challenged by hunting groups who oppose boundary restrictions.

Chapter 4

THREATS TO HAWAII'S FORESTS

Hawai'i's total forest land area has decreased by about 15 percent since estimates were made in 1970. This estimate does not include the large areas of senescent and degraded forest where continued cattle grazing has prevented forest regeneration. Urban and resort developments, although perhaps confined to relatively small, local areas have had a tremendously adverse affect on the health and composition of all of Hawai'i's forests. Competition from alien forest species, as well as actual conversion for development and agriculture continue to threaten what remains of these very unique and vulnerable ecosystems.

4-1. Competition from Alien Species

While perhaps not traditionally recognized as a "threat of conversion" in other states, widespread displacement of native forest species by exotic introductions is the single greatest threat to the health of Hawai'i's forests. This conversion from multi-storied, healthy native forest to mono-type alien forest negatively effects water quality and cultural practices, and is abetted by actual forest conversion to urban, residential and agricultural developments. Many introduced species are secondary successional or "pioneer" (nitrogen fixing trees) species which immediately and extensively invade cleared, degraded or abandoned agricultural sites.

In recent years, people have intentionally introduced thousands of new plants (and animals) to the Hawaiian Islands. Many of these now compete aggressively with the native vegetation of lowland forests. Two alien species that have been particularly destructive to native forest habitats are banana poka (*Passiflora mollissima*) and clidemia (*Clidemia hirta*). The banana poka vines grow over trees and shrubs, eventually shading, weakening and killing them. Other aggressive forest weeds that interfere with--or prevent--the natural regeneration and maintenance of native ecosystems are gorse (*Ulex europaeus*), faya tree (*Myrica faya*), blackberry (*Rubus argutus*), strawberry guava (*Psidium cattleianum*) and *Lantana camara*. These persistent "invaders" have all initially taken hold in developed/degraded areas such as housing tracts, golf course perimeters and degraded pasture. Multi-resource inventory data suggests, however, that once many introduced plants become established beyond a certain threshold level, they can displace natives and invade more favorable sites (Buck et al. 1988). On the island of Oahu, only one percent of the existing koa forest occurs on land capable of producing timber, while 80 percent of the existing guava forests occupy these prime sites.

4-2. Urban and Agricultural Encroachment

Urbanization and intensive agricultural practices have severely altered the natural terrain in lower and middle elevations on all of the major islands. Such development is reflected in obvious modifications to stream habitats such as impoundment, diversion and channelization and less obvious but equally serious effects such as sedimentation and other changes in the nature of runoff into the streams.

Urbanization and development must continue to meet the needs of Hawai'i's growing resident and visitor populations. Between 1982 and 1992, the number of visitors arriving annually increased by approximately 54 percent. Hawai'i's population is growing considerably faster than that of the nation as a whole. Between 1980 and 1988, the total U.S. population increased by 8.5 percent while Hawai'i's increased by 13.8 percent (Department of Business, Economic Development and Tourism 1988).

Some argue that the development threat to remaining forests can be minimized because urban growth projected for the next ten years on all islands can be accommodated by the re-distributing of agricultural land no longer needed to sustain sugar, pineapple or diversified agricultural operations. Urban development proposals already exist for both Hamakua Sugar Company lands and Mauna Kea Agribusiness lands. However, future land uses for these areas need to be assessed within the context of a plan for the economic future of these areas. Also, the rate at which any former agricultural land will become available to various types of urban expansion may not be fast enough. A substantial amount of former sugar company land will be tied up for sometime due to bankruptcy proceedings and deliberation over land re-zoning and/or subdivision.

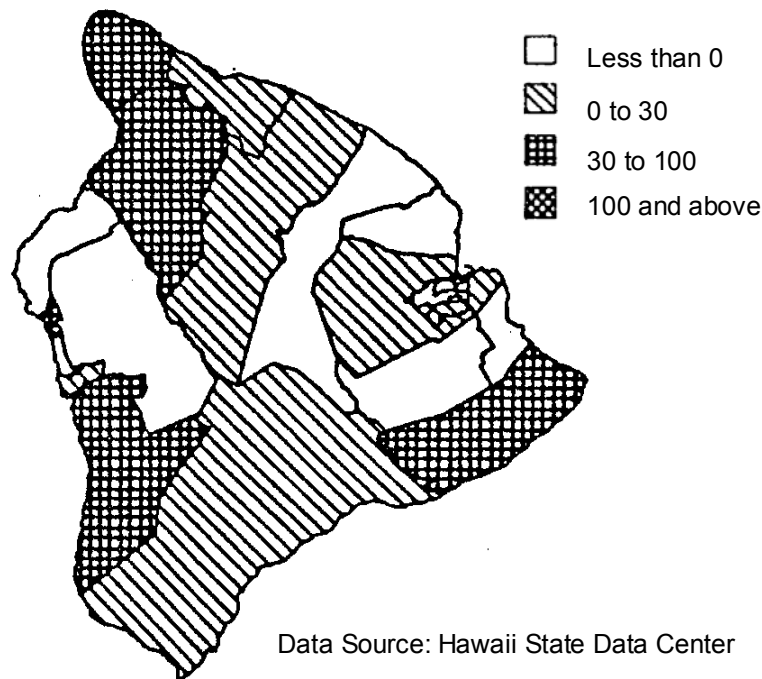
While this transition plays out, upland forest watersheds continue to deteriorate due to a reduction in forest cover. The State Water Resources Development Plan Technical Reference Document (1982) reports that conversion of forest land to other uses still goes on, and that intensive grazing of forest land continues to cause excessive runoff, sediment loading of watercourses, and soil compaction which hinders surface water percolation to groundwater recharge sources.

This situation has long been encouraged by land speculation and a property tax structure that encourages forest conversion to pasture use. The costs of managing watersheds are not considered in the sale or use of the water resource. The tax system in place discourages the use of forests as forests. Forests are often completely or partially converted to pasture because lands dedicated to grazing use have the lowest tax rate. Hawai'i's tax system also interferes with the placement of remaining forest areas into the Conservation District. Landowners strongly resist the placement

of their lands into the Conservation District because their property taxes will increase. Once in the Conservation District, lands are also more difficult to manage because of the Conservation District Use Application (CDUA) process.

Due to pressures from urban development, even agricultural land values are increasing beyond their value for agricultural uses in many areas (Office of State Planning 1992). Recent property tax bills for some of the Big Island ranchers have increased dramatically over previous years due to their increased value. Landowners who must pay taxes based on the developed value of their property are being pushed to use it more intensively or to sell to developers.

Population Growth for Hawaii County by Census Tracts 1980 to 1990 by percent



**Population Projections
1987 - 2010
County of Hawaii**

| | 1987 | | 1990 | | 1995 | | 2000 | | 2005 | | 2010 | |
|--------------|--------------|-----------|--------------|------------|--------------|-----------|--------------|-----------|-------------|-----------|-------------|-----------|
| | 1/ 19.003 | % 16.6 | 2/ 21.157 | % 17.38 | 2/ 25.038 | % 17.6 | 2/ 29.131 | % 18.2 | 2/ 33.9 | % 18.8 | 1/ 39.87 | % 19.3 |
| Puna | | | | | | | | | | | | |
| South Hilo | 45.303 | 39.6 | 47.322 | 38 | 50.187 | 35.2 | 52.064 | 32.5 | 53.7 | 29.7 | 55.52 | 26.9 |
| North Hilo | 1.495 | 1.3 | 1.535 | 1.2 | 1.576 | 1.1 | 1.572 | 1 | 1.54 | 0.9 | 1.5 | 0.7 |
| Hamakua | 5.303 | 4.6 | 5.664 | 4.5 | 6.256 | 4.4 | 6.792 | 4.2 | 7.4 | 4.1 | 8.08 | 3.9 |
| North Kohala | 3.602 | 3.2 | 4.082 | 3.3 | 4.966 | 3.5 | 5.924 | 3.7 | 7.05 | 3.9 | 8.5 | 4.1 |
| South Kohala | 7.097 | 6.2 | 8.486 | 6.8 | 11.133 | 7.8 | 14.14 | 8.8 | 17.75 | 9.8 | 22.3 | 10.8 |
| North Kona | 20.503 | 17.9 | 23.585 | 18.9 | 29.325 | 20.6 | 35.657 | 22.2 | 43.176 | 23.9 | 52.62 | 25.5 |
| South Kona | 7.293 | 6.4 | 7.754 | 6.2 | 8.493 | 6 | 9.139 | 5.7 | 9.8 | 5.4 | 10.66 | 5.2 |
| Kau | 4.7 | 4.1 | 5.014 | 4 | 5.524 | 3.9 | 5.982 | 3.7 | 6.5 | 3.6 | 7.06 | 3.4 |

| | | | | |
|--------|---------|------|---------|------|
| | 100 | 10 | 10 | 100 |
| Totals | 114,300 | 100% | 124,600 | 100% |
| | 142,500 | % | 160,400 | 0% |
| | 180,800 | 0% | 206,100 | % |

1/ County of Hawaii Planning Deptment for Hawaii County Highway Planning Study

2/ M-K projections using distributions derived from 2010 projections

Source: Urban Land Requirements Study. Wilson Okamoto and Ass. '91

Alternative mechanisms continue to be identified and utilized to effectively conserve remaining forest areas within the State. The placement of lands into Conservation Districts has not proven to be an effective forest conservation tool. On the contrary, current policies may actually threaten the continued existence of healthy forests in these areas by discouraging proper management and conservation efforts.

Land tenure, politics, demographics, patterns of consumption and land use, economics, government procedures and statutes have all changed relative to watershed forest protection since the Forest Reserve System was established in the Territory. These changes have occurred faster than have the institutions in place to manage them. The net effect has been the failure of institutions and programs to insure that future generations will be able to enjoy the services and benefits that Hawai'i's forests provide.

Chapter 5

PROTECTING HAWAII'S FORESTS

5-1. Current State Measures

Forest policy in Hawai'i, as implemented by DLNR-DOFAW, is multifaceted. A strong emphasis on the conservation of natural resources is evident both in the historic placement of large areas in Forest Reserves and the current availability of resources to private landowners for forest conservation and management activities. DLNR-DOFAW recognizes that private lands--and landowner actions--are indispensable in meeting the State's natural resource management objectives and that cooperation with landowners must take precedence over restrictive zoning and stringent regulatory control.

A number of cooperative programs are in place to encourage land uses that steward and sustain natural resources and support landowners in these uses. The newest programs and policies promote forestry as an alternative, environmentally sound form of agriculture. Government guidelines for establishing tree farms and agroforestry projects are in place as are cost-sharing state and federal programs for approved private forest management practices. These Programs encourage/support native forest rejuvenation and timber plantation establishment on former pastures and sugar plantation lands, and they strive to reduce pressure on remaining, relatively intact, native forests.

Policy

The *Tree Farms Program* provides for the equitable taxation of private lands classified as commercial forest lands based upon their suitability for the production of wood in quantity sufficient to establish a business in the sale thereof. The timber owner pays a yield tax of five percent of the stumpage value of the merchantable trees cut in lieu of all real property and general excise taxes. To qualify as a Tree Farm, the owner must develop and maintain a commercial stand of timber under forestry practices in conformity with statute conditions and rules and regulations prescribed by the DLNR.

The most significant piece of current legislation is the *Hawai'i Tropical Forest Recovery Act* passed by the U.S. Congress in 1992. This Act directed the establishment of a Task Force that, in August of 1994, made recommendations to the U.S. Department of Agriculture for support and action for Hawai'i forests, including a national experimental forest. Such a forest would be the focal point for necessary research, demonstration, training and public education. The Act encompasses all forms of forestry, including production, restoration, conservation and agroforestry.

Cost-Sharing

The State *Forest Stewardship Program* offers financial and technical assistance to landowners who wish to restore, manage and/or protect important natural resources on Hawai'i's forested and formerly forested lands. Through this Program, many have already developed resource management plans and realized forest management and protection benefits on their properties. This State Program functions alongside the federally funded *Forest Stewardship* and *Stewardship Incentive Programs* which provide additional cost-sharing resources to a variety of private non-industrial forest owners.

Forest Preservation

State agencies also continue to emphasize wildlife habitat preservation, and the protection of relatively intact native forests. Concern about Hawai'i's natural ecosystems led to the establishment of a statewide *Natural Area Reserve System* in 1970. A commission was established with members appointed by the Governor. Its duties include recommending specific land and water communities of unique flora and fauna, as well as geological sites, to be managed by DLNR in their natural state as Natural Area Reserves. Funding was then made available in 1990-1992 for cost-sharing with private landowners dedicated to perpetual conservation and management of pristine native forests through the *Natural Areas Partnerships Program*.

While extinctions of native species continue to occur, increased funding for biodiversity conservation is expected as a result of a lawsuit forcing the U.S. Department of the Interior Fish and Wildlife Service to accelerate the federal listing of Hawai'i's threatened and endangered species.

Research

Concern for Hawai'i's endangered plants and animals led to the passage of "Conservation of Aquatic Life, Wildlife and Land Plants" legislation in 1985. The DLNR was authorized and directed to conduct research and make investigations on any species of wildlife or land plants in order to develop information on their biology, status, distribution and habitat needs. The law also addresses the identification of threatened and endangered species, and general conservation program coordination and review.

A *Forest Pest Control Partnership* exists between the University of Hawai'i, the U.S. Forest Service Institute of Pacific Islands Forestry, the National Park Service, the Hawai'i Department of Agriculture and the DLNR. An example of this arrangement is the cooperation between the University of Hawai'i and DLNR-DOFAW to solve

the koa die-off problem which is occurring on Oahu.

The USDA Forest Service Pacific Southwest Experiment Station conducts forest research on the islands, in cooperation with the State. Specific projects are undertaken under cooperative agreements with the University of Hawai'i, the Department of the Interior National Park and Fish and Wildlife Services, the Kamehameha Schools Bishop Estate Trust, the Hawai'i Sugar Planter's Association and other organizations in addition to DLNR-DOFAW. One research work unit concentrates on Hawai'i forest ecosystem restoration. Results inform efforts to restore endangered species habitat, stabilize watersheds and supply forest products. Recent work has focused on natural forest regeneration, native forest bird habitat restoration, reforestation with native species at high elevations and biological control of forest weeds. Research results are disseminated through direct collaborative relationships, reports, letters, conferences and publications.

Public Awareness through Recreation

The recreational value of Hawai'i's forests has increased with the implementation of *Na Ala Hele*, the *Hawai'i Statewide Trail and Access System*. Na Ala Hele was established in 1988 to develop and improve existing and historic mountain and shoreline trails and accesses, while helping to conserve Hawai'i's cultural and recreational heritage.

The recreational value of Hawaii's forests has increased due to the growth in both public and commercial demand for areas where multiple use recreation can be accommodated. Hiking, bicycling, equestrian use, in addition to specific forested areas suitable for off-highway vehicles and four wheel drive vehicles, occurs on DLNR managed trails and access roads, and on specific private lands throughout the state. Increased recreational access fosters greater appreciation and support for Hawaii's forests.

There is an immediate and acute need for mechanisms that will effectively manage and enhance remaining forest resources on private lands while existing programs expand and public education provides necessary awareness and changes in perception. It is also becoming clear, that the scopes of these programs may not together address all private forest scenarios.

5-2. Forest Legacy Program

As discussed in Chapter 5-1, several mechanisms and programs are already in place to protect and restore Hawai'i's forest resources. Also described previously, the State's zoning system establishes Conservation District boundaries to protect important natural, scenic and cultural resources through various degrees of land use

control.

Unfortunately, these mechanisms have not proven themselves as adequate. The cost-share and preservation programs in place apparently do not address the needs or desires of many large landowners. Conservation District classification is not effective. It can in fact, for reasons previously discussed, be counter-productive.

Many holdings within the Conservation District currently reflect a mix of land uses that one would expect to find on industrial zoned land or in Urban Districts. This is largely due policies, laws and rules governing uses in the Conservation District--from 1964 through 1978--that permitted quarries, resorts, subdivisions, residential uses, commercial and industrial communications and energy facilities. Although these uses are no longer permitted in the Conservation District, evaluation criteria still allow the approval of non-conservation type land uses in specific Conservation District subzones.

Statewide Distribution of Significant Biological Resources Occurring Outside of the Conservation District

| Resource Type | Number of Sites | | | | | | Total Sites (% of Total) |
|----------------------------------|-----------------|-------------|----------------|--------------|-------------|---------------|-----------------------------|
| | <i>Kauai</i> | <i>Oahu</i> | <i>Molokai</i> | <i>Lanai</i> | <i>Maui</i> | <i>Hawaii</i> | |
| Native upland Forest & Shrubland | 3 | 1 | 6 | 2 | 13 | 30 | 55 (45%) |
| Coastal Ecosystems | 7 | 7 | 4 | 2 | 2 | 12 | 34 (28%) |
| Wetlands & Waterbird Habitats | 10 | 14 | 3 | 0 | 1 | 1 | 29 (23%) |
| Streams | 9 | 3 | 2 | 0 | 3 | 1 | 18 (15%) |
| Lava Tubes & Caves | 3 | 0 | 1 | 0 | 3 | 3 | 10 (8%) |
| Endangered or Rare Species | 19 | 23 | 13 | 4 | 18 | 33 | 110 (91%) |
| Total Sites on Island | 19 | 24 | 15 | 4 | 21 | 38 | 121 (100%) |

Source: The Nature Conservancy of Hawai'i 1991

The scopes and capabilities of the incentive programs described previously are limited by their specific mandates and small budgets. Lands that are defined as having "potential natural area quality" may not qualify for Forest Stewardship Program funding. At the same time, the same "natural area quality" may not be unique enough to qualify the holding for inclusion in the Natural Area Partnership Program. The Forest Stewardship Program requires only a ten-year management commitment. Penalties for withdrawal from any of these programs are minimal. Additional incentives and programs that promote wise use, long-term management, native species habitat enhancement, and ensure sustainable use of forest resources, are needed to complement these programs.

In an attempt to identify program gaps and weaknesses, more clearly define landowner needs, and explore additional forest conservation strategies, the Office of State Planning (OSP) and DLNR-DOFAW recently led an inter-agency assessment and information-sharing program. Since 1991, the Kona, Kohala and East Maui watersheds have been the focus of this program. Information meetings, round-table discussions and workshops involving all concerned have examined the forest values to be protected and a gamut of legal tools including rezoning, cost-sharing, tax incentives, and conservation easements.

Also in 1991, the State began a statutorily-mandated review of the classification (state-level zoning) of all land in the State. State Land Use District Boundary Reviews (SLUDBR) are required each five years. These reviews give State regulatory decision makers opportunities to review urbanization proposals with a broad, comprehensive view, rather than incrementally on a case-by-case basis. They also provide for identification and reclassification of conservation and agricultural resource lands that may not be in the appropriate land-use district. SLUDBRs indicate where changes to existing land-use district boundaries are necessary and they guide land-use planning decisions. They include reviews of Hawai'i State Plans, State Functional Plans, individual County General Plans, Development Plans, Community Plans, baseline studies, resource mapping through the State's Geographical Information System, public information/participation components, and extensive coordination with state, county and federal agencies and other private and public organizations and individuals.

During the most recent SLUDBR process, it became quite clear that the reclassification of lands to the Conservation District may not be the best way to deal with currently "unprotected" forests. Landowner participants expressed strong resistance to placing their lands within the Conservation District. Stricter regulations and permit requirements will inhibit their ability to fully manage the resources on their land. They object to potential restrictions and claim--with adequate evidence--that their financial borrowing power would be affected. Ranchers and farmers feel that they would have to obtain Conservation District Use Applications (CDUAs) for minor operational activities.

There are other problems with land reclassification and Conservation zoning. Reclassified parcels are always open for future reclassification back to a more intensive use. County governments are resistant, just as landowners are, to any changes that may reduce their control--or home rule. Conservation agencies agree that if lack of management is a consequence of reclassification, other solutions are necessary. Given the influx of exotic pests in Hawai'i, lack of management is likely to

lead to further forest degradation and loss of important habitats and rare species. Many environmentalists feel that Conservation District regulations may not be restrictive enough. For example, residences and golf courses may be permitted in certain sub-zones within the Conservation District. Enforcement and education of existing Conservation District regulations are also limited. Current public and private funding is inadequate to meet the needs on lands already within the Conservation District, and more resources need to be directed toward the management of public and private lands to manage and enhance these valuable public resources.

Most recognize that Hawai'i needs to increase landowner-driven and proactive, rather than administrator-driven and regulatory approaches in solving its natural resource problems. The Kona/Kohala Natural Resource Area Workshops indicated that landowners might be more willing to cooperate if participation were voluntary and compensation were forthcoming for property/land-use rights foregone. One quote from a Workshop participant does particularly good job of summarizing public comment: "If the useful value of a property is substantially [reduced] as would result from the reclassification from Agriculture to Conservation District allowing only minimal economic value to remain...the question of fair compensation ... needs to be addressed as a matter of equity if not law".

In the face of these pressures, the Forest Legacy Program over the past 10 years has operated as a promising proactive and voluntary approach that addresses this question of fair compensation and has enabled effective conservation partnerships. Hawai'i's Forest Legacy Program has been effective in the limited, important Forest Legacy Areas established in 1994 as "test areas" where forested watersheds on private land on the Big Island were immediately threatened by conversion to non-forest uses.

An expanded Hawai'i Forest Legacy Program would address many existing program weaknesses and gaps throughout the State. For a decade, the Forest Legacy Program has encouraged active forest resource management and wise use in the South Kona area. Active management is clearly necessary to ensure the regeneration and sustenance of productive, biodiverse forest ecosystems in Hawai'i. The ability to acquire fee title and perpetual easements across important forest areas statewide would help other islands prevent reclassification in response to changing economic pressures or government policies.

Forest Legacy has provided a crucial tool to protect watershed areas in West Hawai'i, and can do the same in other critical forest areas. The Program recognizes that forest conservation and landowner management objectives can be complimentary. Periodic review will continue to encourage management responses to changing environmental, social and economic opportunities and constraints. Use restrictions

have been evolved and built into management plans to protect valued forest resources from being exploited as devalued commodities during periods of excessive economic pressure, risk or hardship. These valuable lessons learned in the original, small Forest Legacy Areas at South Kona and Kohala can now be expanded and applied to other equally-qualified areas of the state.

Chapter 6

PROGRAM PRIORITIES

6-1. Administration

The purchase of fee simple and conservation easement interests in forest lands by the U.S. Forest Service under the Forest Legacy Program from willing owners of important forest areas help protect in perpetuity the values of Hawai'i's forests. Easement purchase agreements require a Forest Stewardship or similar plan that addresses traditional forest uses and public values. Privately owned working forests have been protected as local and State economic assets, while environmental values have been preserved on the same land.

The Governor of the State of Hawai'i has designated the Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW) as the lead agency to carry out the implementation of the Forest Legacy Program, including its expansion to other areas if this amended Assessment of Need is approved. DLNR-DOFAW currently has a staff of roughly 50 professionals. In addition, the State of Hawai'i has recently opted for the State Option and will have a dedicated staff member to address Forest Legacy projects in Hawai'i.

DLNR-DOFAW has cooperated with other divisions and related agencies and organizations to successfully implement the Program over the past decade. These include the Division of Land Management, which administers management of all State lands, leases and easements amounting to over one million acres; The Office of State Planning (OSP) which provides staff assistance and expertise in resource identification, planning and easement negotiations; and other department members who have provided technical mapping assistance with the State Geographical Information System.

Once enrolled in the program, individual tracts are monitored and managed by DLNR-DOFAW Cooperative Forestry Program staff, who also have extensive experience with management and monitoring of tracts enrolled in the state's Forest Stewardship Program.

The State Forest Stewardship Committee, representing many sectors of the interested public, strongly supports the expansion of the Hawai'i Forest Legacy Program as proposed in this document. The Committee unanimously endorsed and approved the 2004 amended AON at its September 23, 2004 meeting in Hilo, Hawai'i. The Committee originally officially approved the 1994 Assessment of Need at its September 13, 1994 meeting in Honolulu (see Appendix, Chapter 11 for corresponding meeting minutes). Committee members include (or have included) landowners, professional foresters, a resource biologist, a forestry researcher, a plant materials specialist, a planner and a

wildlife specialist. Represented organizations, institutions and agencies are the DLNR-DOFAW, U.S. Forest Service, the Nature Conservancy of Hawai'i, The Trust for Public Land-Hawai'i, the Department of Hawaiian Home Lands, the Association of Conservation Districts, the U.S.D.A. Soil Conservation Service, the U.S. Fish and Wildlife Service, the University of Hawai'i, Kamehameha Schools Bishop Estate and Campbell Estate. The latter are two of the largest Hawai'i landowners.

The Forest Stewardship Committee serves DLNR-DOFAW in an advisory capacity as the Division implements and develops the Forest Legacy and State Forest Stewardship Programs. As these programs continue to expand, DLNR-DOFAW will expand the Committee as necessary--and form designated subcommittees--to coordinate the Program.

The Division anticipates no difficulties in continuing to provide the 25% minimum cost-share required for individual fee simple and easement acquisition. The successful projects in the South Kona test Forest Legacy Area have shown that this match is possible. The State Forest Stewardship and Natural Area Partnership (NAP) Programs currently provide funding assistance to private landowners for management activities. Forest Legacy Tracts of unique enough natural area quality qualify for financial assistance under the NAP for implementation of forest management plans. The state legislature has created permanent dedicated funding sources for these programs. Where exercised on lands designated as Legacy areas, these programs would count toward the cost-share portion. (Forest Stewardship Management Plans will be required for most Forest Legacy agreements.) The coordinator assigned to the Forest Legacy Program, other professional and clerical staff support from a variety of State agencies, and the donation of easements or portions of easement values from some private landowners interested in participating in the program can also qualify as State match funding. Finally, local open space and forestry protection funding measures were passed in 2002 in Maui County and Kaua'i County. Expanding the FLA to these areas will allow matching funds for Forest Legacy projects from county sources.

6-2. Background to Forest Legacy Eligibility

This amended 2004 AON recognizes that threats to forest areas are present throughout the State of Hawai'i and replaces the two very limited Forest Legacy Areas established in 1994 with one statewide Forest Legacy Area divided for working purposes only into sub-areas, one for each major Island in the state. Much of the same reasoning that led to the original designation of "eligible lands" applies to the specific criteria utilized to select eligible lands in the new Hawai'i FLA. The following section provides a brief overview of the general situation facing Hawai'i's forested areas in 2004, and describes the goals and objectives of the Forest Legacy Program in Hawai'i. It also describes in detail the 2004 eligibility criteria for the Hawai'i FLA.

Hawai'i Forest Overview 2004

The natural environment of Hawai'i is diverse--geologically, physiologically, climatologically and ecologically. Hawai'i's forests provide scenic benefit, tremendous cultural resources, pure water, and unparalleled recreational opportunities for residents and visitors alike.

The forests of Hawai'i cover watersheds and watershed recharge areas that are essential to existing and proposed settlements, industries and resorts throughout the state. These forests also contain many relatively intact examples of native Hawaiian forest ecosystems including koa, ohia, mamane and sandalwood. These ecosystems are home to hundreds of rare or endangered species of plants, animals or invertebrates. Hawai'i's forests also include rare ecosystems such as lava tube ecosystems not known to exist elsewhere in the world.

Threats

Both State and privately owned forests in Hawai'i are subject to a number of factors that threaten their continued existence. Threats to forests and their function include: wildlife habitat destruction by wildfire, feral animals and game animals; the introduction of alien plant species; the alteration of ground and surface water quality; urban encroachment or other conflicting uses; and, often most widely obvious, deforestation and degradation by cattle grazing operations. There is an immediate need throughout the state for mechanisms that will encourage forest management and use, and remove pressures that currently degrade or convert remaining forest areas.

Private use of these important forest and watershed resources for purposes that threaten their continued function has long been a concern to State agencies and environmental organizations. Continued development in Hawai'i's forest areas for non-resource based purposes such as urban or resort, and resource-based uses such as grazing would result in important forest resource losses for both the State--and the world.

The public in Hawai'i is increasingly concerned that if lands important to watershed protection/yield are left susceptible to speculation, agricultural use, or development, they will be subdivided, converted to pasture for more favorable tax consideration, or in other ways developed to land uses that are incompatible with watershed protection and enhancement.

During the original 1994 Assessment of Need process, on-the-ground research and public sensing clearly indicated that the primary threat to Hawai'i's remaining forest areas was continued cattle grazing on forested and partially forested tracts of land throughout the state, most prominently on the island of Hawaii. This continues to hold

true in many areas. Observation indicates that grazing effectively prevents the regeneration of many native forest species, primarily koa, which is highly palatable to cattle, especially at the seedling stage. Enclosure studies have demonstrated that where cattle are excluded on formerly grazed sites, forests consisting of previously existing species quickly re-establish themselves with little or no encouragement. In the case of koa, seeds can remain viable in the soil for up to 50 years. If cattle are removed and a site preparation technique involving scarification is applied, koa seedlings soon cover the ground.

In addition, logging, though minimal, continues to remove remaining native "seed trees" from fragmented koa patches, degraded koa woodlands and deforested pasture lands.

Forests throughout the Hawaiian Islands are rapidly being invaded by non-native species and urban uses that do not support native species or habitat. It is currently difficult to find native low land dry systems due to their easy accessibility for competing agricultural land use and urban growth. Because of their relatively slow rate of succession, native ecosystems in these low land dry areas have not been able to keep up with disturbance over time.

Resort developments, though limited, also threaten certain tracts of these forests. Islands such as Oahu and Maui continue to become more developed and crowded, and tourists have begun to make more visits to other islands, especially Kaua'i and Hawai'i.

Increased infrastructure for tourism and expanding resident housing developments will also continue to require water for drinking, utilities and irrigation, as well as more land.

Throughout Hawai'i, it is clear that most landowners recognize and value the many products and services that the forests on their land provide. It is also clear, however, that under present circumstances, most are not willing to invest in the management of these forests or commit their lands to forestry in perpetuity. These circumstances, which in themselves threaten the health and survival of these forests, have already been outlined in Chapter 4: the conspicuous lack of incentive to forestry investment; the Hawai'i tax structure; the long term and uncertain nature of forestry investments; public policy actions that threaten future forest returns; and alternate, more lucrative land uses.

Options

It is apparent that many of these forest areas will continue to decline or be converted to non-forest uses unless some sort of effective mechanisms, whether regulatory or incentive-based, are put into place to encourage their conservation. Protection of these areas conforms to the objectives and policies of the Hawai'i State Plan for the physical

environment, Sections 226-11 and 13, including but not limited to, seeking effective protection of Hawai'i's unique and fragile environmental resources, encouraging the protection of rare or endangered species and habitats native to Hawai'i, exercising an overall conservation ethic in the use of Hawai'i's natural resources, and promoting the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes and other natural features. Protection of these areas also conforms to the Priority Guidelines for population growth and land resources, Section 226-104, HRS, including but not limited to, restricting development when drafting of water would result in exceeding the sustainable yield or in significantly diminishing the recharge capacity of any groundwater area. The State Water Resources Plan also calls for increased protection of watersheds.

The minimal price of landowner cooperation in any forest protection or stewardship program is respect for property ownership plus fair treatment. Regulation, unless constantly monitored and enforced is usually not an effective tool in Hawai'i. Many landowners have, however, indicated that they would be willing to forego some economic return and the enjoyment of certain property rights for the public's interest, if they are compensated fairly for doing so, as they would be through the Forest Legacy Program.

6-3. Goals

The 1994 AON depended heavily on findings by the State Land Use review conducted in 1992. During the State Land Use District Boundary Review process, many thousands of acres of public and private forest lands throughout Hawai'i were identified as containing important natural resources which required further management or conservation. Many of these forest areas are home to threatened and endangered species and contain important watersheds. Based on this process, the following Environmentally Important forest areas were targeted:

- Contain at least 10 percent forest cover.
- Serve an important watershed/hydrologic function.
- Provide one or more of the following traditional forest uses/public values:
 - Wildlife and fish habitat
 - Existing threatened/endangered species
 - Native plant conservation
 - Public recreational opportunities
 - Public hunting opportunities
 - Known historic cultural resources
 - Timber and/or wood products
 - Non-wood forest products
 - Scenic/ Aesthetic resources

The Hawai'i State Forest Stewardship Committee has broadened this 1994 mandate to create Goals and Objectives for the Forest Legacy Program's work in this 2004 AON. The FSC has established the following general goals for the Program to be utilized in Hawai'i:

- 1) Protect Hawai'i's unique and fragile environmental resources
- 2) Encourage the protection of rare and/or endangered species
- 3) Promote the preservation of aesthetic beauty in Hawai'i
- 4) Preserve watershed health and protect the sustainable yield of fresh water
- 5) Protect working forests as economic assets for the state and counties of Hawai'i
- 6) Protect traditional and cultural forest practices and resources
- 7) Protect recreational forest practices

6-4. Objectives

The objects of the Legacy Program are to identify and protect individual characteristics on the land that are encompassed by the broad goals above, while also fulfilling certain policy goals and fostering an application process which encourages successful projects. The Hawai'i Forest Stewardship Committee has created a detailed prioritization checklist for individual tract applications which mirror the objectives of the program and give practical, real advice to applicants and DLNR-DOFAW staff in implementing these objectives with respect to individual projects. Please see Chapter 8-1 through 8-4 for Objectives and implementation guidelines.

6-5. 2004 Forest Legacy Eligibility Criteria

With the help of new technology, the Hawai'i FSC has been able to closely tailor the 2004 AON Hawai'i Forest Legacy Area to include the environmentally important and threatened areas in the state by using four comprehensive, GIS-mapped, easy-to-apply criteria. These new criteria replace the original, limited 1994 FLA's and expand the program's reach to critical new areas while still providing rational, focused locations from which potential interested private landowners can apply to the Forest Legacy program.

Additionally, each criteria is based on well-known as well-publicized previously existing data sets. As such, the GIS maps are parcel specific and offer much more accuracy and clarity than the 1994 FLA maps. It should also be noted that the boundary of the Hawai'i FLA is defined and described by the data sets as of October 1, 2004, which are readily available to the public for review.

The four 2004 AON Forest Legacy Eligibility Criteria are described below:

1. Prime Forest Lands Criteria

Prime forest lands are those described in the State of Hawaii “Prime Forest Lands Inventory of Maui, Kauai, Oah’u, Molokai, Lanai, and Hawaii Tri-Isle Resource Conservation and Development Council”. Department of Land & Natural Resources Division of Forestry & Wildlife, US Department of Agriculture, Forest Service, Region 5, and Soil Conservation Service. 1982. The physical criteria chosen for identifying prime and unique forest lands are those that accurately measure a given sites ability to grow certain wood products. These include rainfall, soil depth, drainage, slope, elevation, exposure to wind and ocean spray, and substrate. The designation of prime forest land identifies the most productive forest lands in terms of timber or biomass production. As such, this eligibility criteria identifies current forest lands and lands with excellent potential for restoration to forest cover. The identification of lands as prime forest land does not denote a single or dominant use, nor does it preclude the use of these lands for other forest products, uses, or services. In early 2002, all data from these inventories were scanned into a GIS and made into maps. The Prime Forest Land criteria include only land parcels designated prime forest lands in Hawai’i by the state as of October 1, 2004. Any subsequent changes to the data set or additions to designated areas must be amended into the AON at a future date.

2. Conservation District Criteria

The State Land Use Law (Chapter 205, Hawaii Revised Statutes) is unique in the history of Hawaii land use planning. Originally adopted by the State Legislature in 1961, the Land Use Law establishes an overall framework of land use management whereby all lands in the State of Hawaii are classified into one of four Districts: Urban, Rural, Agricultural or Conservation. Conservation lands are comprised primarily of lands in existing forest and water reserve zones and include areas necessary for protecting watersheds and water sources, scenic and historic areas, parks, wilderness, open space, recreational areas, and habitats of endemic plants, fish and wildlife. The Conservation District also includes lands subject to flooding and soil erosion, where watershed protection is particularly critical. Conservation Districts are administrated by the State Board of Land and Natural Resources and uses are governed by rules promulgated by the State Department of Land and Natural Resources. The Conservation District criteria includes only land parcels designated Conservation District in Hawai’i by the Land Use Commission as of October 1, 2004. While Conservation District lands have more protection from conversion and/or development than any other land designation in the State, they are still subject to any number of threats. These lands are the most valuable in the State because they are critical watershed areas, house the highest number of threatened and endangered (more than any given region in the United States), stabilize vulnerable steep slopes from landslides, flooding, and provide coral reef protection.

Any subsequent changes to the data set or additions to designated areas must be amended into the AON at a future date. The State considers these lands the most valuable and the most critical, therefore, believes it is necessary to provide an extra layer of protection from any landowner who wishes to get involved in the Forest Legacy Program from using these lands in any way other than conservation.

3. Critical Habitat Criteria

The U.S. Endangered Species Act of 1973 provides a legal mechanism for the conservation of threatened and endangered species, and ecosystem/habitat on which they depend. Critical habitat is defined as areas with physical and biological features essential to the conservation of threatened or endangered species, and that may require special management considerations or protection. Any action that may affect these species or the habitat in which they are dependent upon, must first be examined by the U.S. Department of Fish & Wildlife Service. Critical habitat is determined by considering facts such as a species' current range, historical range, and ecosystem features necessary for reproduction. Other factors such as economic and social impacts of designating critical habitat are also considered. The critical habitat criteria include only land parcels designated critical habitat in Hawai'i by the USFWS as of October 1, 2004. Any subsequent changes to the data set or additions to designated areas must be amended into the AON at a future date.

4. Public & Private Watershed Partnerships Criteria

Watershed partnerships are voluntary alliances of public and private landowners in Hawai'i committed to the common value of protecting large areas of forested watersheds for water recharge and other values. Because participation in watershed partnerships is totally voluntary, and because the societal values associated with the watershed lands is so great, it is important that members have the option of selling to society, (government), those development rights which may degrade the critical watershed values. Water has long been recognized as the most important product of Hawaii's forest lands. Forested watersheds reduce the rain's erosive effects, prevent soil from washing into the ocean, increase infiltration rates into the soil, draw moisture from the clouds, and deliver a consistent and dependable source of surface and artesian water. Watershed partnerships allow members to work together in four basic management arenas: (1), feral animal control, (2) non-native weed control, (3), management of necessary infra-structure such as roads and trails, and (4), public education and volunteer programs. Members of Watershed Partnerships are able to utilize tax dollars and leverage federal, state, county, and private funds for the common goals of watershed managements.

The Watershed Partnership eligibility criteria allows individual tracts within the 830,000 acres of land which are currently enrolled in one of the nine existing Watershed

Partnerships in the State of Hawaii to be eligible for the Forest Legacy Program. The Watershed Partnerships are unique public-private partnerships that have agreed to work together for the common good of their watershed lands. The Watershed Partnership criteria include only land parcels designated as within a private-public watershed partnership in Hawai'i by the FSC as of October 1, 2004. Any subsequent changes to the data set or additions to designated areas must be amended into the AON at a future date. The nine Watershed Partnerships recognized as eligible for Forest Legacy and their memberships are listed as follows:

1. West Maui Watershed Partnership, (50,000 acres)

The Maui County Board of Water Supply
Kamehameha Schools
C. Brewer and Company Limited
Amfac/JMB Hawaii, LLC
Maui Land & Pineapple co., Inc.
State Dept. of Land and Natural Resources
The County of Maui

2. East Maui Watershed Partnership, (100,000 acres)

State Dept. of Land and Natural Resources
The Nature Conservancy of Hawaii
The Maui County board of Water Supply
Haleakala Ranch Co.
East Maui Irrigation Co., Ltd.
Haleakala National Park
Hana Ranch
The County of Maui

3. Ko'olau Watershed Partnership, (100,000 acres)

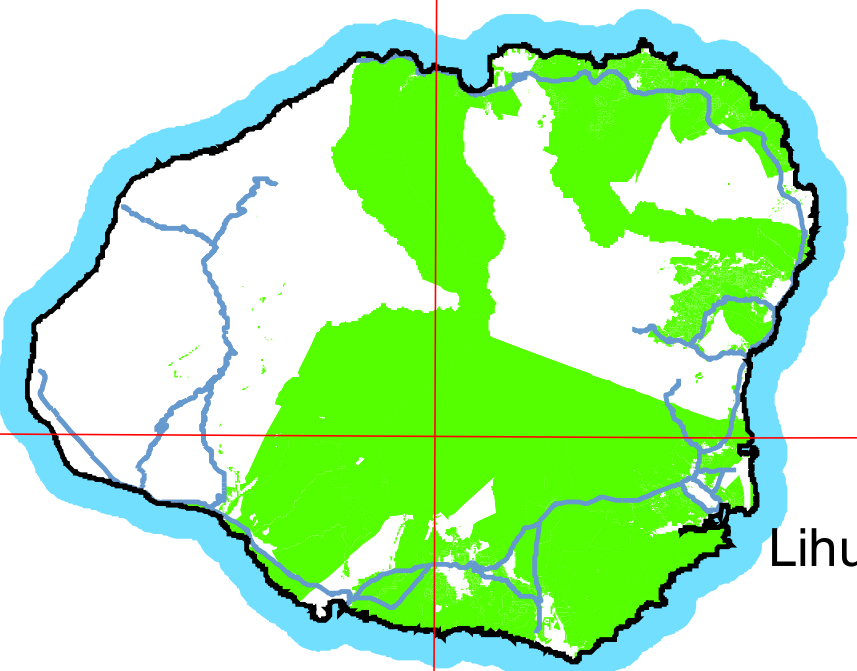
Kamehameha Schools
State Dept. of Land and Natural Resources
State Dept. of Hawaiian Home Lands
Agribusiness Development Corporation
U. S. Army
U. S. Fish and Wildlife Service
Honolulu Board of Water Supply
Queen Emma Foundation
Bishop Museum
Manana Valley Farm LLC
Tiana Partners
Dole Food Co., Inc.

4. Kauai Watershed Partnership, (50,000 acres)
Kauai Dept. of Water
Kamehameha Schools
State Dept. of Land and Natural Resources
Alexander and Baldwin Properties, Inc.
Kauai Ranch LLC
Gay and Robinson, Inc.
McBryde Sugar Co., Ltd. Lihue Land Co.
5. Lanai Forest and Watershed Partnership, (20,000 acres)
Castle & Cooke
Maui County Board of Water Supply
Hui Malama Pono O Lanai
State Dept. of Land and Natural Resources
US Fish & Wildlife Service
Molokai-Lanai Soil and Water Conservation District
The Nature Conservancy of Hawaii
6. East Molokai Watershed Partnership, (20,000 acres)
Kamehameha Schools
Kapualei Ranch
Ke Aupuni Lokahi Enterprise Community GB
EPA
Hawaii Dept. of Health
State Dept. of Land & Natural Resources
Maui County
Kalaupapa National Park
Maui Board of Water Supply
Molokai-Lanai Soil and Water Conservation District
US Fish & Wildlife Service
The Nature Conservancy of Hawaii
7. Ola'a-Kilauea Partnership, (420,000 acres)
US Fish and Wildlife Service
State Dept. of Land and Natural Resources
Kulani Correctional Facility
Kamehameha Schools
8. Leeward Haleakala Watershed restoration Partnership, (43,000 acres)
Dept. of Hawaiian Home Lands
James Campbell Estate
Haleakala National Park
Haleakala Ranch

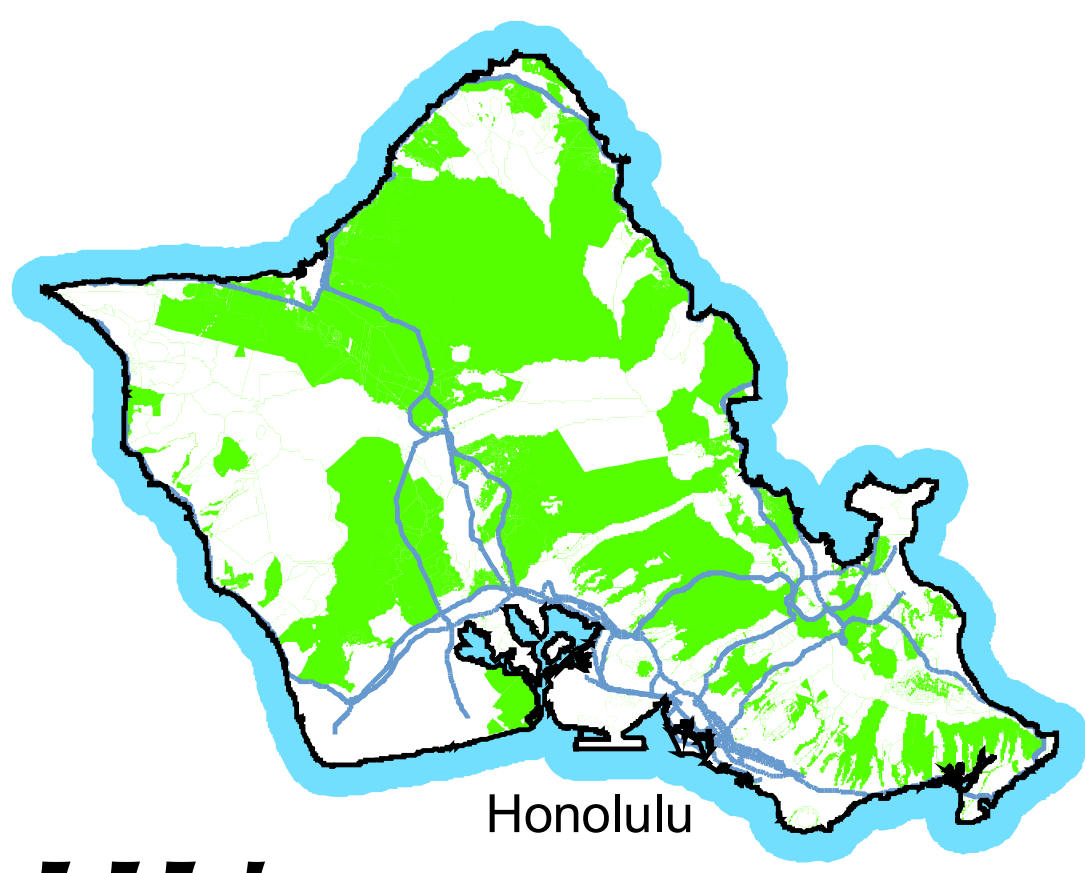
Kaonoulu Ranch
Nu'u Mauka Ranch
State Dept. of Land and Natural Resources
Ulupalakua Ranch
John Zwaanstra

9. Kohala Watershed Partnership, (31,000 acres)
Dept. of Hawaiian Home Lands
Dept. of Land and Natural resources
Dept. of Water Supply
Kahua Ranch, Ltd.
Kamehameha Schools
Laupahoehoe Nui LLC
The Nature Conservancy
Parker Ranch, Inc.
Ponoholo Ranch, Ltd.
Queen Emma Foundation
Surety Kohala Corporation

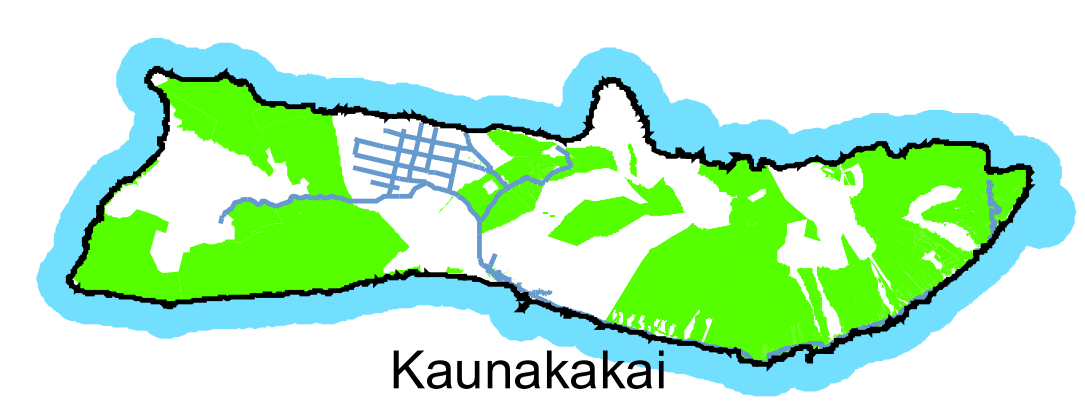
Forest Legacy Areas in the State of Hawaii



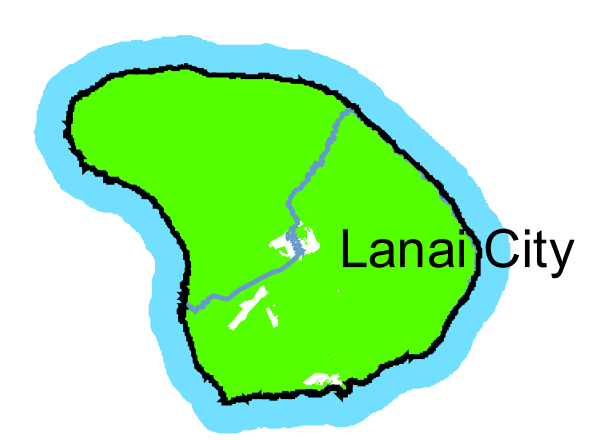
**KAUAI
FLA**



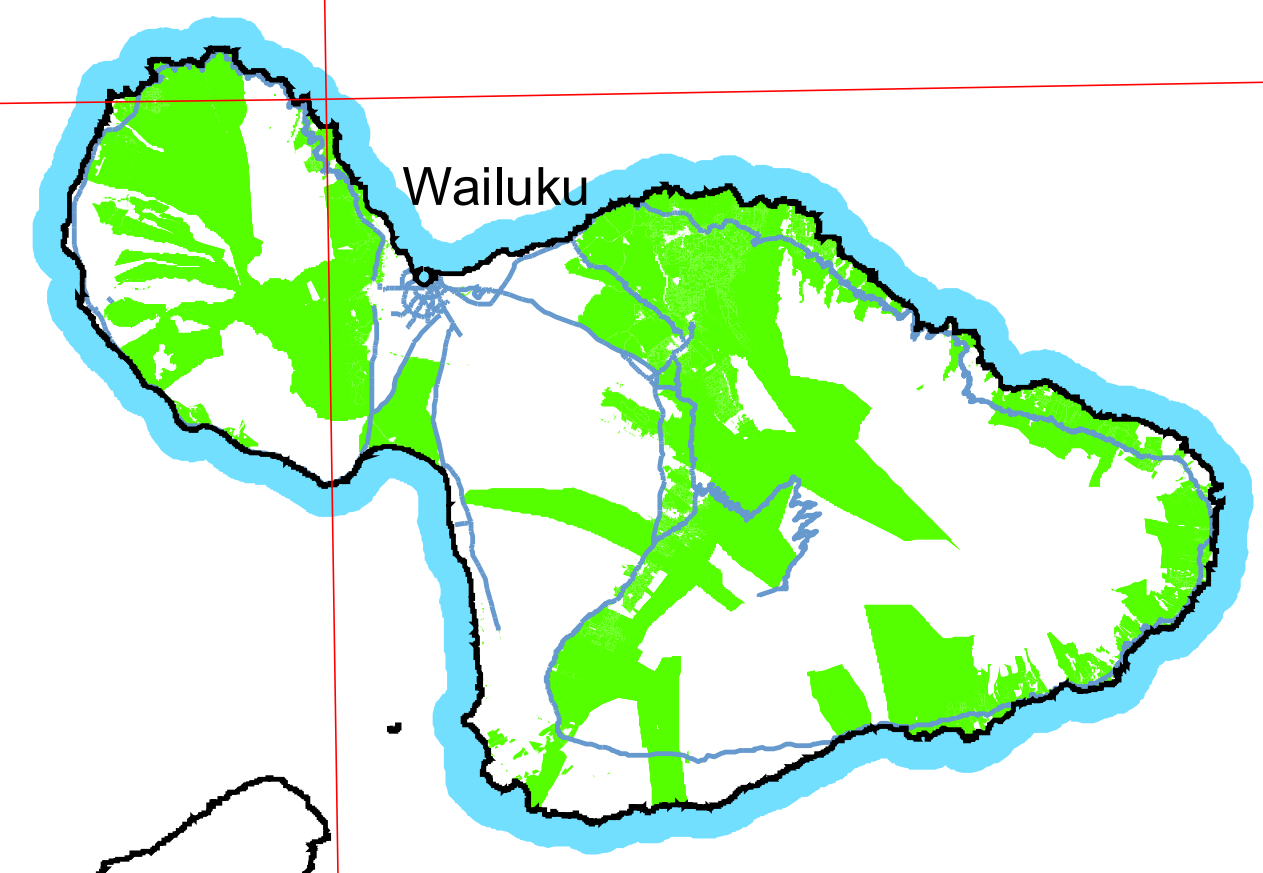
**OAHU
FLA**



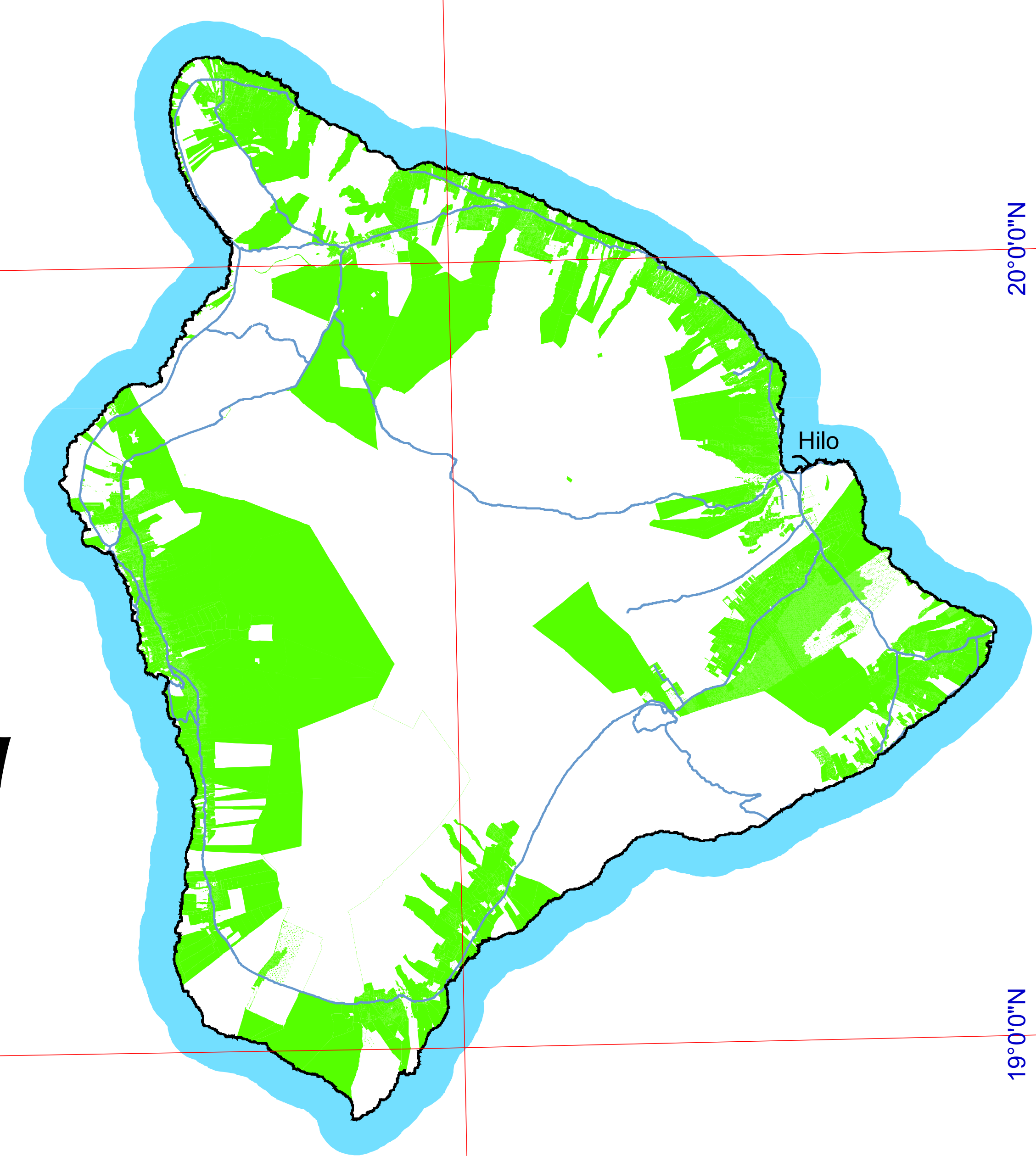
**MOLOKAI
FLA**



**LANAI
FLA**



**MAUI
FLA**



**HAWAII
FLA**

Legend

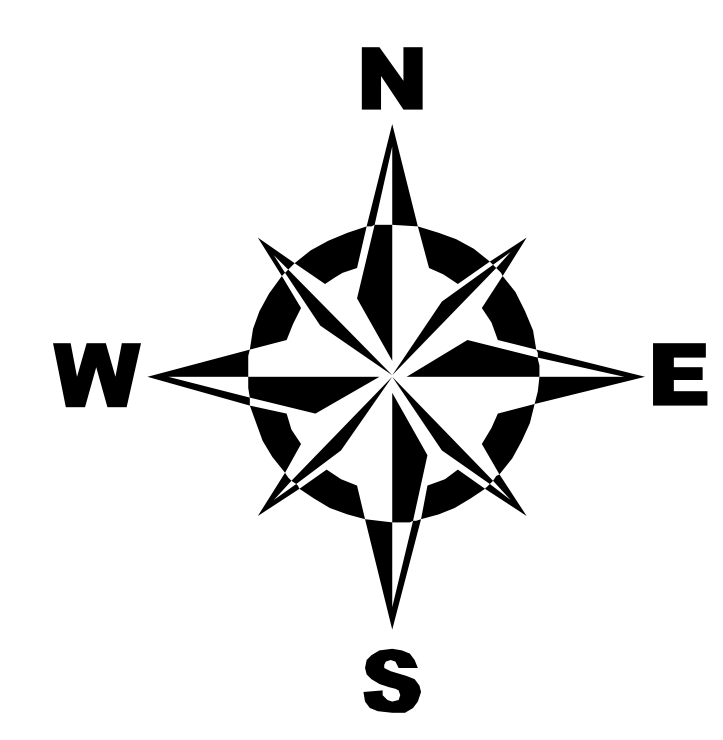
 Hawaii Forest Legacy Areas (FLA)
Eligible Private Lands

(FLA detailed locations are available from Division of Forestry & Wildlife.)

 Major Roads



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0631 (01/2005)



Chapter 7

7-1. Hawai'i Forest Legacy Area

This section identifies and describes the proposed Hawai'i Forest Legacy Area based on the updated 2004 criteria detailed in Chapter 6-5. Final designations were made by utilizing the four criteria, and mapped with GIS data from the State of Hawai'i DLNR. The Forest Legacy Area's described below are delineated by Island for purposes of clarity and compatibility with county jurisdictions. Field research carried out during the 1994 AON primarily by DLNR-DOFAW, the Office of State Planning (OSP), the Nature Conservancy of Hawai'i (TNCH) and the U.S. Fish and Wildlife Service (USFWS), were considered and are retained below as "areas of emphasis" with the Island sub-units.

The following are some detailed descriptions of eligible Forest Legacy Area (FLA). While we have provided some specific examples of areas of emphasis, we consider all lands that fall within the new four criterion mapped areas to be worthy of eligibility and application for the Forest Legacy Program. All of these important forest lands deserve consideration for protection and special management practices to protect and conserve important plant and animal species, and are essential to supporting human activity and resource needs in Hawai'i.

7-2. Island of Hawai'i

The Island of Hawai'i is the largest island in the state, boasting the bulk of the state's forest lands and working forest areas. Development and population growth have increased on the Island of Hawai'i faster than other islands in recent years, however, and subdivisions in native forest areas have adversely impacted watershed quality in many areas.

The two Forest Legacy Areas originally established in 1994 are contained within the new, larger Hawai'i FLA, but remain areas of emphasis because of the continuing threats in these areas. These areas continue to be at a high risk of conversion by development, although successful forest legacy acquisitions have helped protect several important forest tracts in the South Kona area (**APPENDIX F**). The Forest Stewardship Committee will continue to encourage applications from these areas of emphasis.

Forest Legacy Area : Island of Hawaii

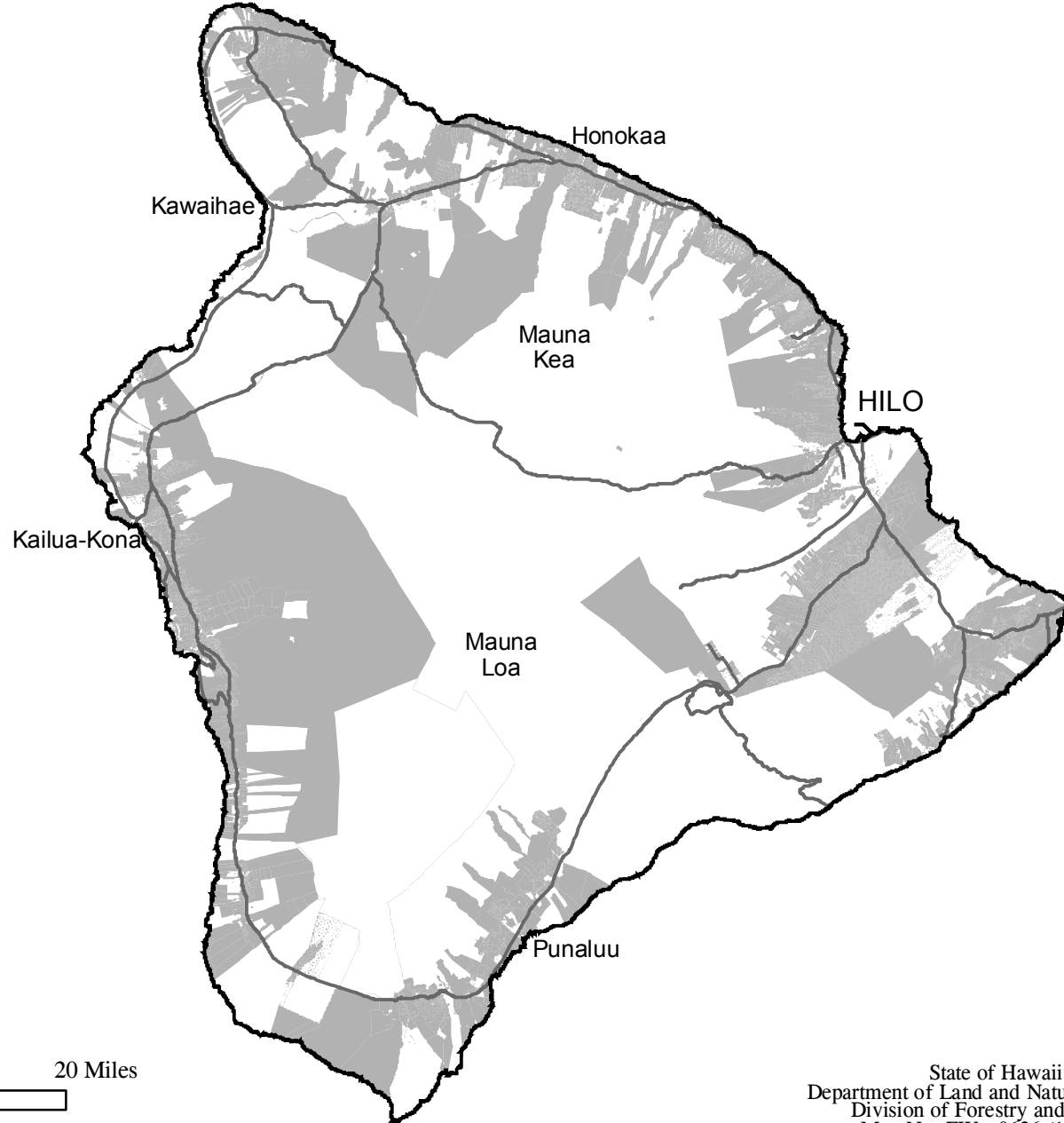
Legend

■ Eligible Private Lands

— Major Road



0 10 20 Miles



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0626 (10/2004)

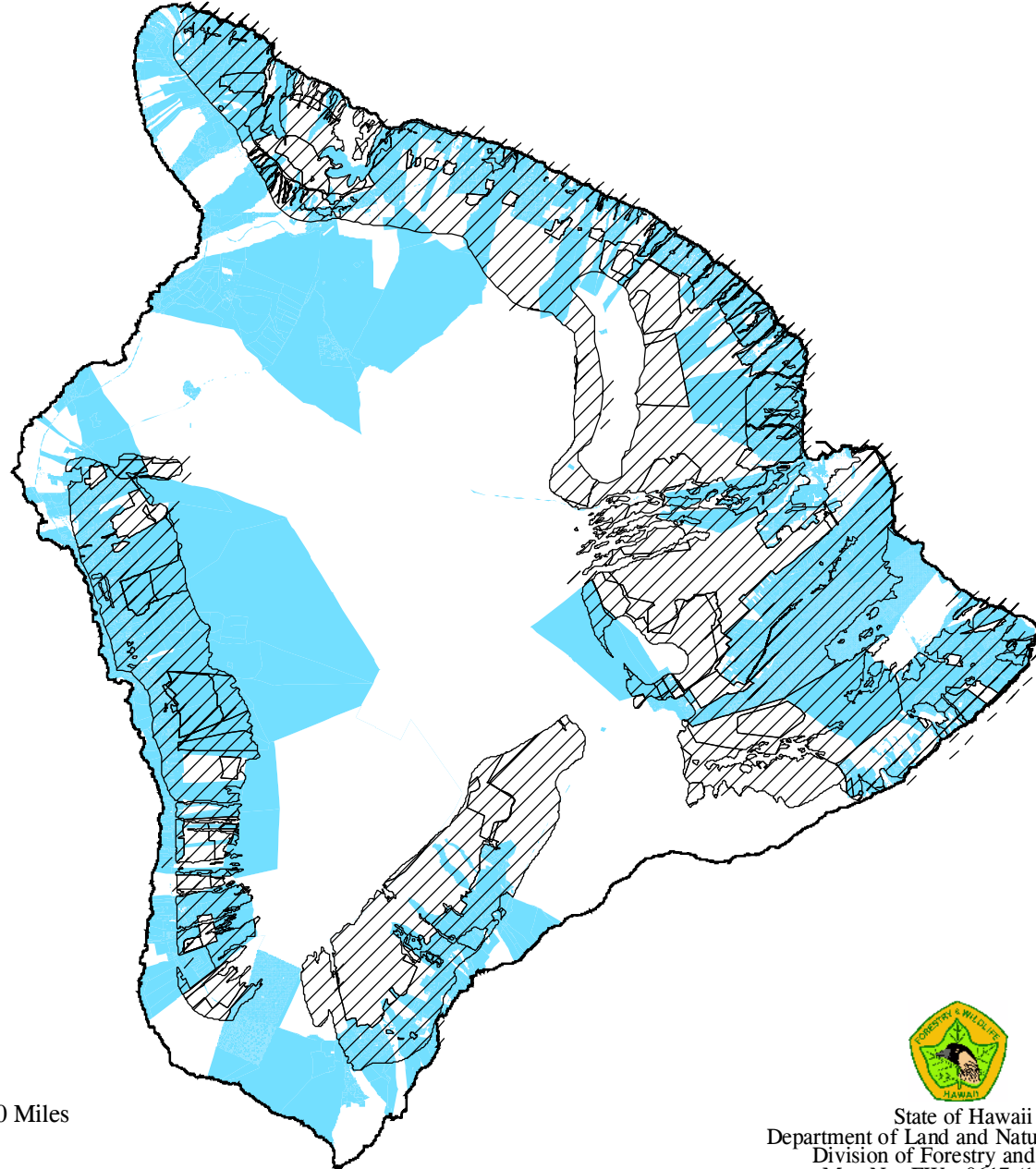

Private Lands and Prime Forest Lands : Island of Hawaii

Legend

-  Prime Forest Lands
-  Private Lands



0 10 20 Miles



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0617 (10/2004)

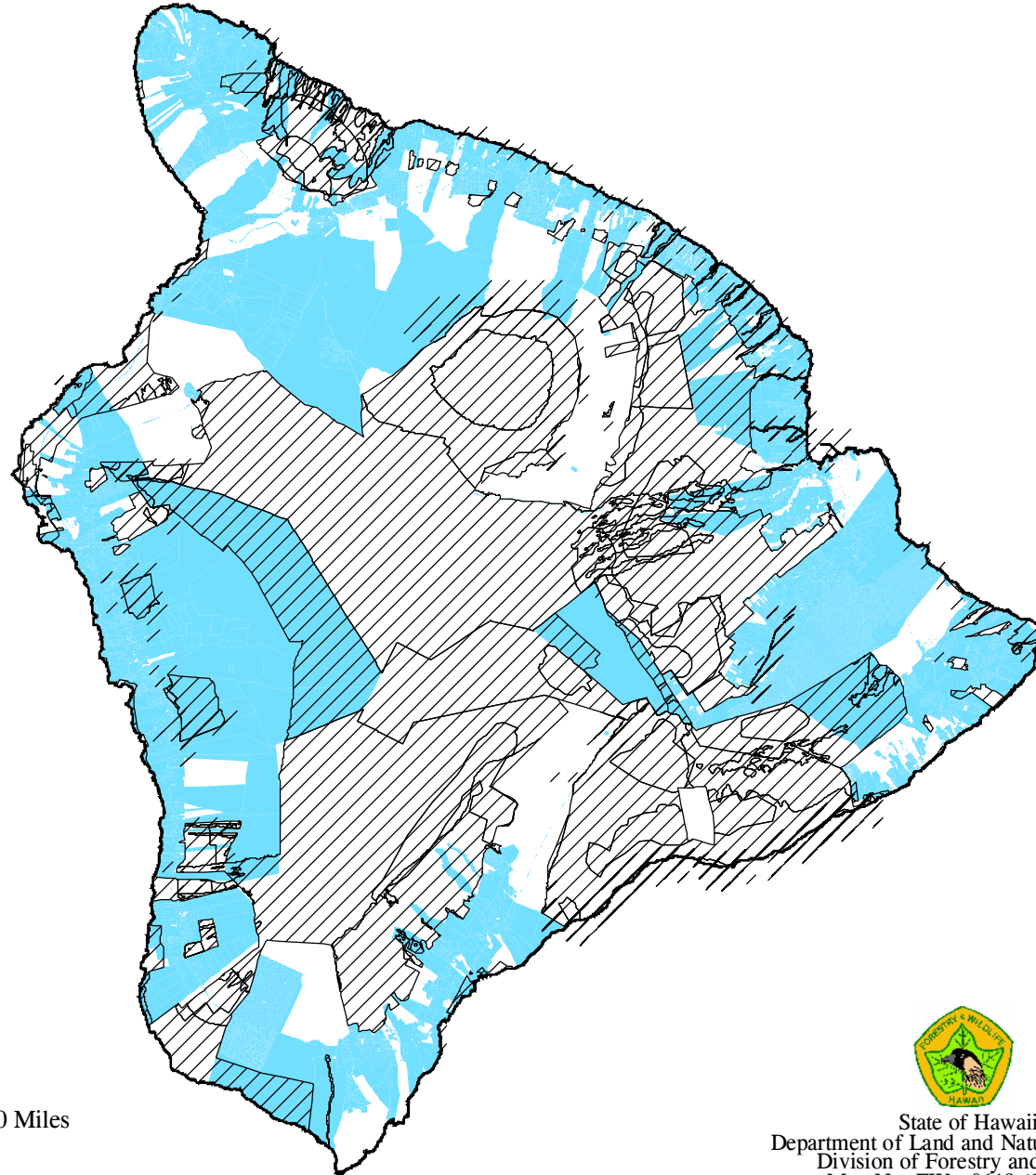

Private Lands and Conservation Districts : Island of Hawaii

Legend

-  Conservation Districts
-  Private Lands



0 10 20 Miles



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0619 (10/2004)

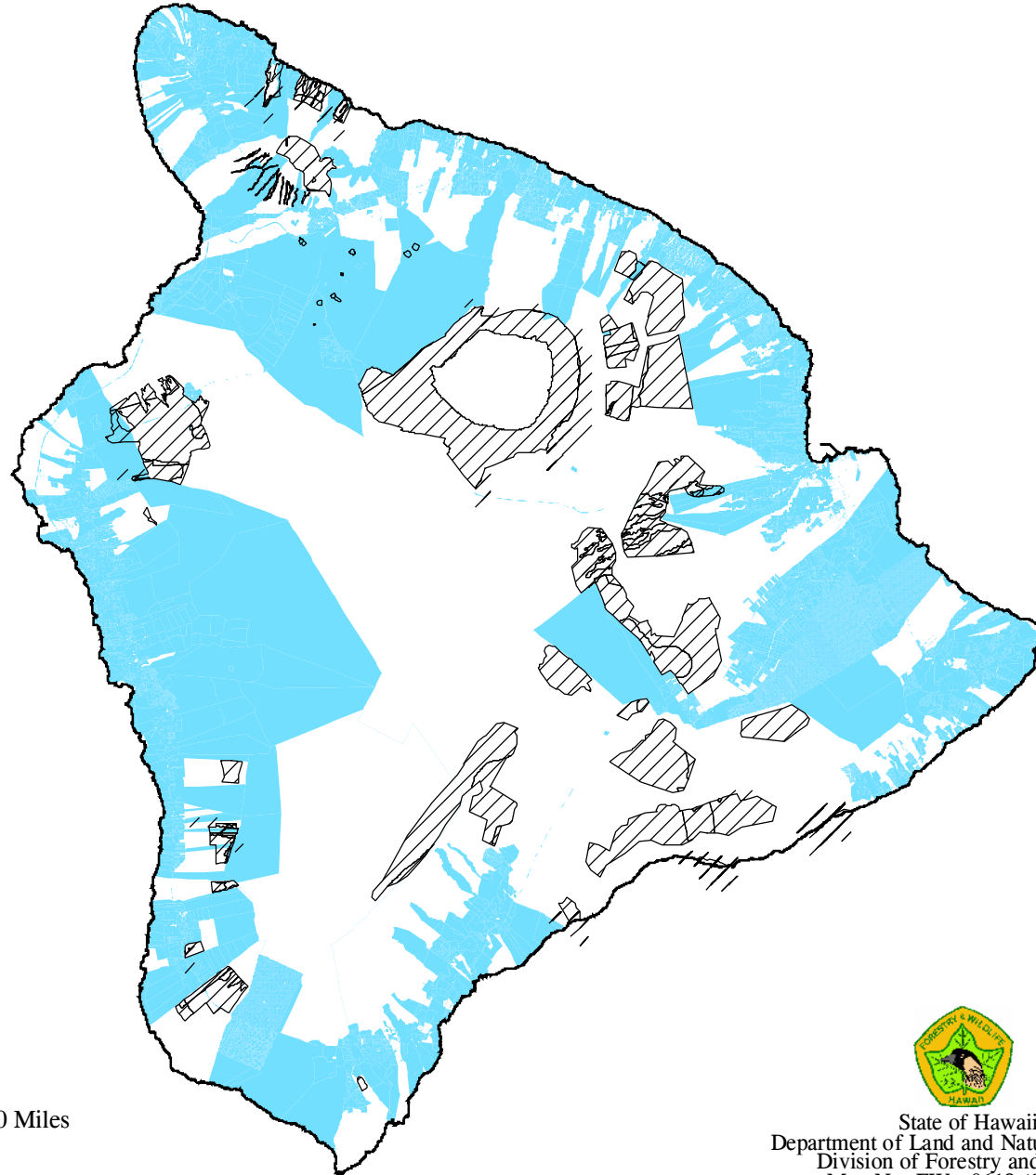

Private Lands and Critical Habitats : Island of Hawaii

Legend

-  Critical Habitats
-  Private Lands

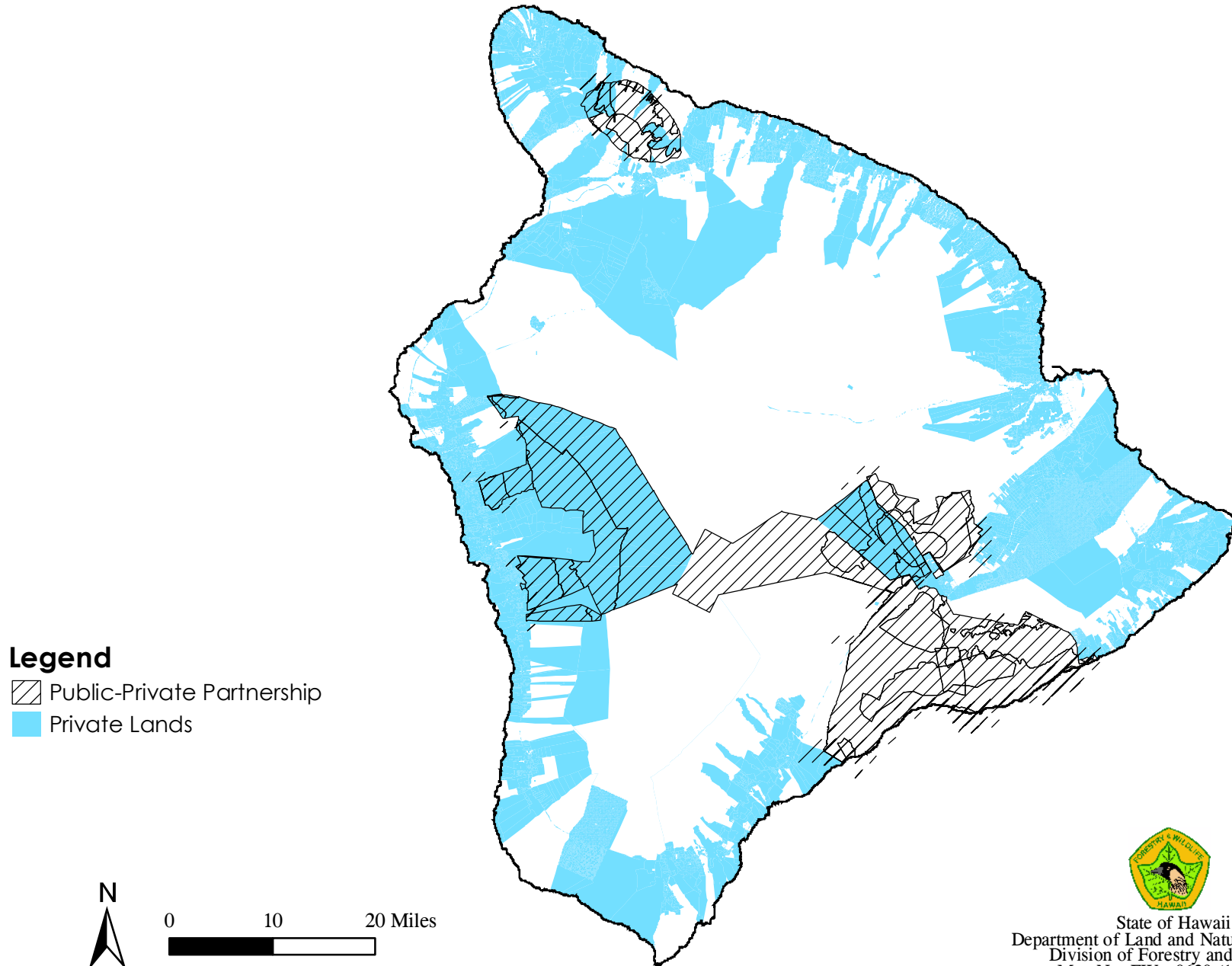


0 10 20 Miles



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0618 (10/2004)

Private Lands and Public-Private Partnership : Island of Hawaii



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0620 (10/2004)

South Kona

The first area of emphasis is the Kona Watershed Area. Conditions in the South and North Kona Districts have changed considerably since district boundary lines were first drawn. Since then, water has become a critical issue. Billions of dollars have been invested in the shoreline areas and thousands of additional visitor and residential units are planned which will require water to sustain their growth. Upland Kona watersheds are the ultimate generators of water supply for the area. If altered so that their positive hydrologic features are debased, their developable water supply will be reduced. There are no alternative water supplies feasibly available to support the urbanization of Kona. The unprecedented growth of the North Kona District is already taxing the existing well source to capacity. Maintenance of the remaining mountain forest cover is probably the most cost-effective means of maximizing recharge of the perched and basal aquifers which are essential to long-term development and quality of life in North Kona.

Forest cover in the area also serves to mitigate flood hazards to communities located on the west slopes of Hualalai and Mauna Loa. The area surrounding and including these communities is characterized by under-developed or poorly defined drainage ways, all subject to potential flooding if up-slope watershed recharge/infiltration capacity is reduced as through forest clearing. Residents are subject to increasing hazards from floodwater damage as land is utilized more intensively (North Kona Flood Plain Management Study and South Kona Area Flood Hazard Analyses, Soil Conservation Service, U.S. Department of Agriculture, 1983 and 1978 respectively).

In addition to their important watershed and flood control functions, remaining Kona forests include many native ecosystems and provide habitat for several rare, threatened and endangered plant and animal species. There are still large tracts of Native Hawaiian forest including koa, ohia, mamane, and remnant sandalwood. The quality of these forests ranges from relatively intact to highly grazed.

The mid-elevation forests have been thinned or eliminated in areas by grazing and logging, but many still provide excellent habitat for several of Hawai'i's endangered forest birds. Hualalai and Central Kona-Kealia contain essential habitat for the Hawaiian creeper (*Oreomystis mana*), Hawaiian akepa (*Loxops coccineus*), Hawaiian crow or alala (*Corvus hawaiiensis*) and the akiapola'au (*Hemignathus munroi*). These areas are identified in the Hawai'i Forest Bird Recovery Plan, USFWS, and the Alala Recovery Plan, USFWS.

Groundwater is the principle water resource in the Kona District and the only one that can be exploited on a large scale. It has been known for the last century that basal groundwater constitutes the zone of saturation from the coast to an unknown

distance inland and that this resource would yield potable water if wells were drilled several miles inland and pumped at rates of 1 million gallons per day (mgd) or less. In the past several years, however, high-level groundwater has been discovered inland of the 1,500 ground elevation contour from Hualalai southward at least to Kealahou. This discovery expands opportunities for developing a reliable supply of potable groundwater without fear of salinization that accompanies seawater intrusion. Should this high-level resource prove to be extensive, its productivity and quality will have to be protected through proper management of the high rainfall-fog region where the principle recharge takes place.

Kohala

The second area of emphasis is the Kohala Mountain Watershed, a large area of uplands above the Kohala Mountain Road that has greater than 60-75 inches of annual rainfall. This is an area of concern due to its importance for water recharge and its native flora and fauna resources.

The existing Conservation Zone in the Kohala mountain range extending from Pololu to Waipio Valley yields approximately 40 million gallons per day (mgd) of groundwater to an array of ditches and tunnels. In addition, water is diverted from streams on the leeward slope above Waimea for municipal and irrigation uses. Substantial groundwater resources have also been identified by exploratory drilling northwest of Pololu on the windward side, and to some extent in the dry leeward sector. These groundwater resources are expected to become principal sources of domestic supply for developments in the South Kohala district as well as in the regions where they occur. The existing Conservation zone tributary to these water resources is quite small. The draft Watershed Protection Study conducted by the University of Hawai'i Water Resources Research Center for the Five-Year Boundary Review recommends expanding the Conservation District in the North Kohala mountains to generally contiguous areas having greater than 60 to 75 inches (north side) average rainfall, but also to include somewhat lower rainfall zones where volcanic vents and cinder cones can reasonably be incorporated.

This area has also been identified as having relatively high concentrations of native plant taxa listed or under review for endangered or threatened status, according to the Threatened and Endangered Fire Map, DLNR. Portions of the area contain intact wet ohia forest, and areas in the back of Pololu and Honokane Valleys provide scenic vistas. The area also contains numerous volcanic vents and prominent cinder cones.

As in the Kona District, the majority of these lands are in the Agricultural District and their remaining forests are subject to conversion, primarily by grazing-use degradation. Grazing conditions in existing forested pasture areas preclude the regeneration of forest species. These areas are in a state of rapid decline.

The current land use prevalent throughout the area is ranching. The Forest Legacy Program could help to acquire grazing rights through conservation easement acquisition and thus eliminate this threat of forest conversion.

While we describe these two areas in more detail than other areas on the island of Hawaii, we are concerned about water recharge capacity and human development impacts on native ecosystems throughout the island.

7-3. Island of Kaua'i

The Island of Kaua'i is famous for its lush mountains and heavy rainfall. However, increasing development and rising land prices continue to threaten areas that were previously used strictly for agricultural or conservation purposes. Kaua'i is home to several small agri-forest enterprises and has committed local county funding to land purchase and protection, which may help match Forest Legacy funding.

A area of emphasis within Kaua'i's FLA sub-unit is Olokele Valley. This area includes the mountains above Waimea town and Makaweli, from Manuahi Valley to Mokuone Valley, including Olokele Valley. Twenty rare plant taxa are known to exist in the area. This area also contains pockets of intact native forest vegetation. The native forest extends down to approximately 2,500 feet in elevation and it is suspected that there are many rare native plants down to 1,500 feet elevation in the gulches. The area is currently zoned agricultural and in a state of decline due to a long history of grazing use.

The acquisition of grazing rights to tracts within this area would remove grazing pressure and allow the existing fragmented native forest pockets to regenerate and spread from gulches into currently grazed areas. The expansion and improved health of these native forests would provide additional native wildlife habitat and improve the watershed function of gulches.

Forest Legacy Area : Island of Kauai



Legend

- Eligible Private Lands
- Major Road

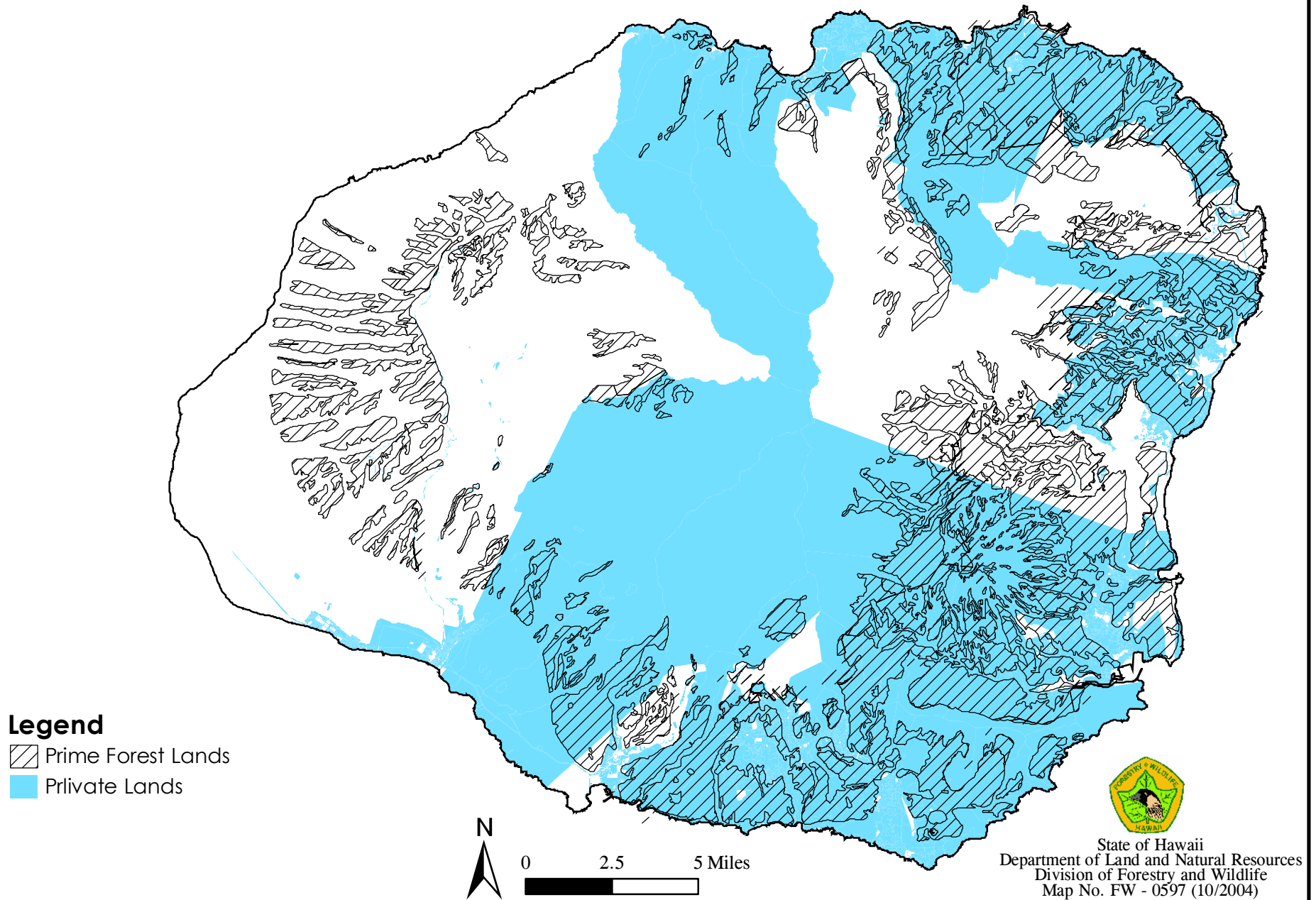


0 2.5 5 Miles

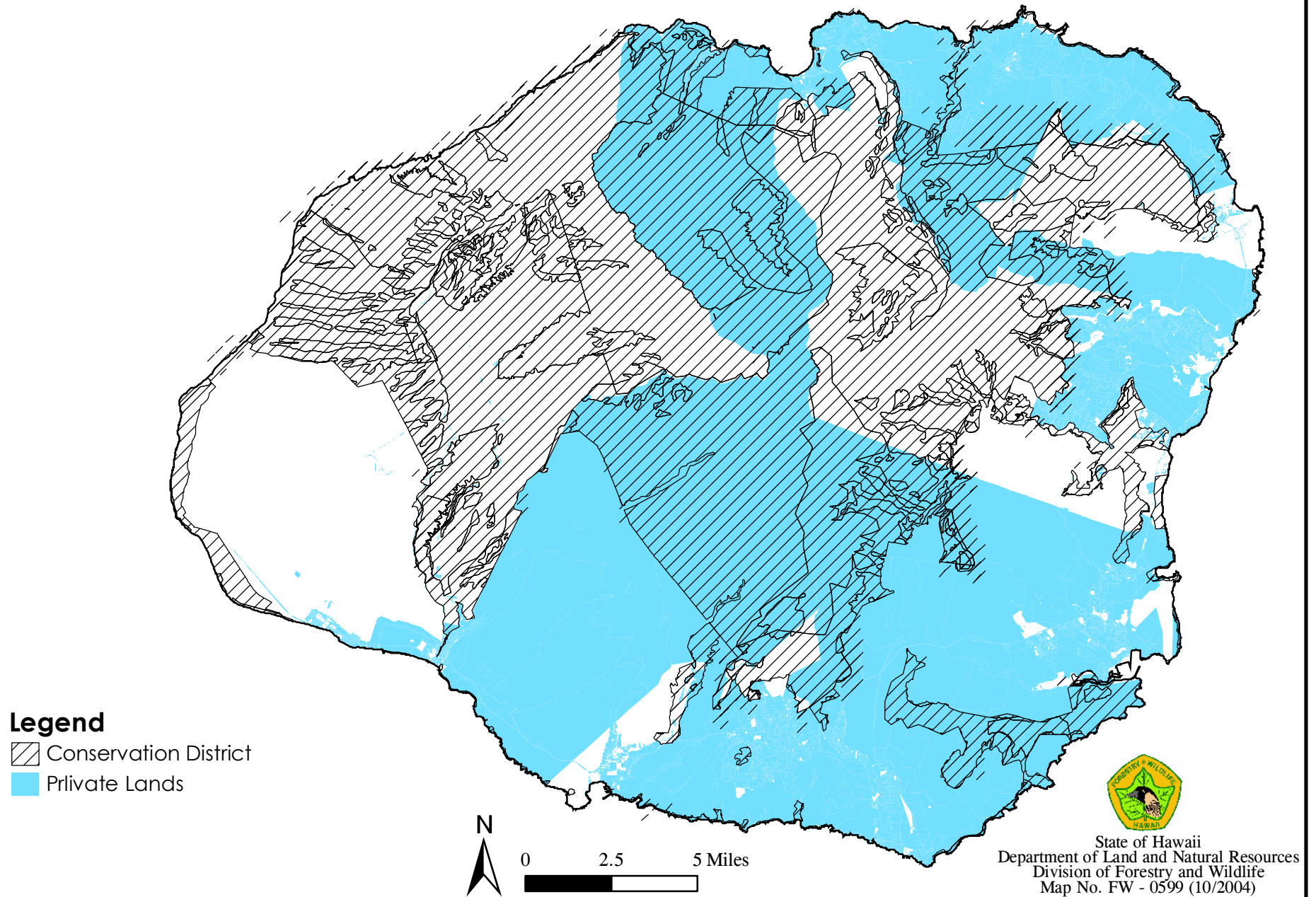


State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0621 (10/2004)

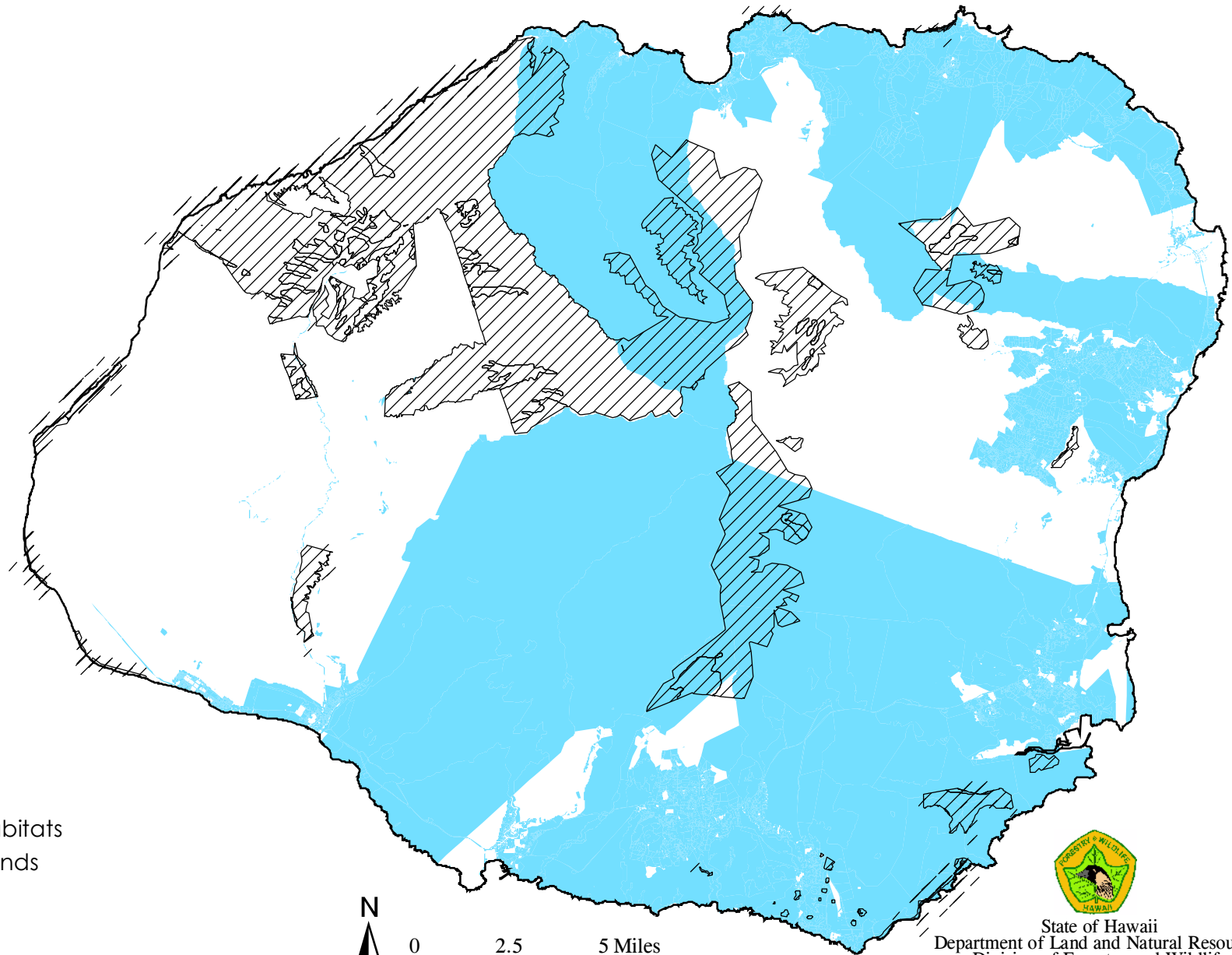
Private Lands and Prime Forest Lands : Island of Kauai



Private Lands and Conservation District : Island of Kauai



Private Lands and Critical Habitats : Island of Kauai



Legend

-  Critical Habitats
-  Private Lands

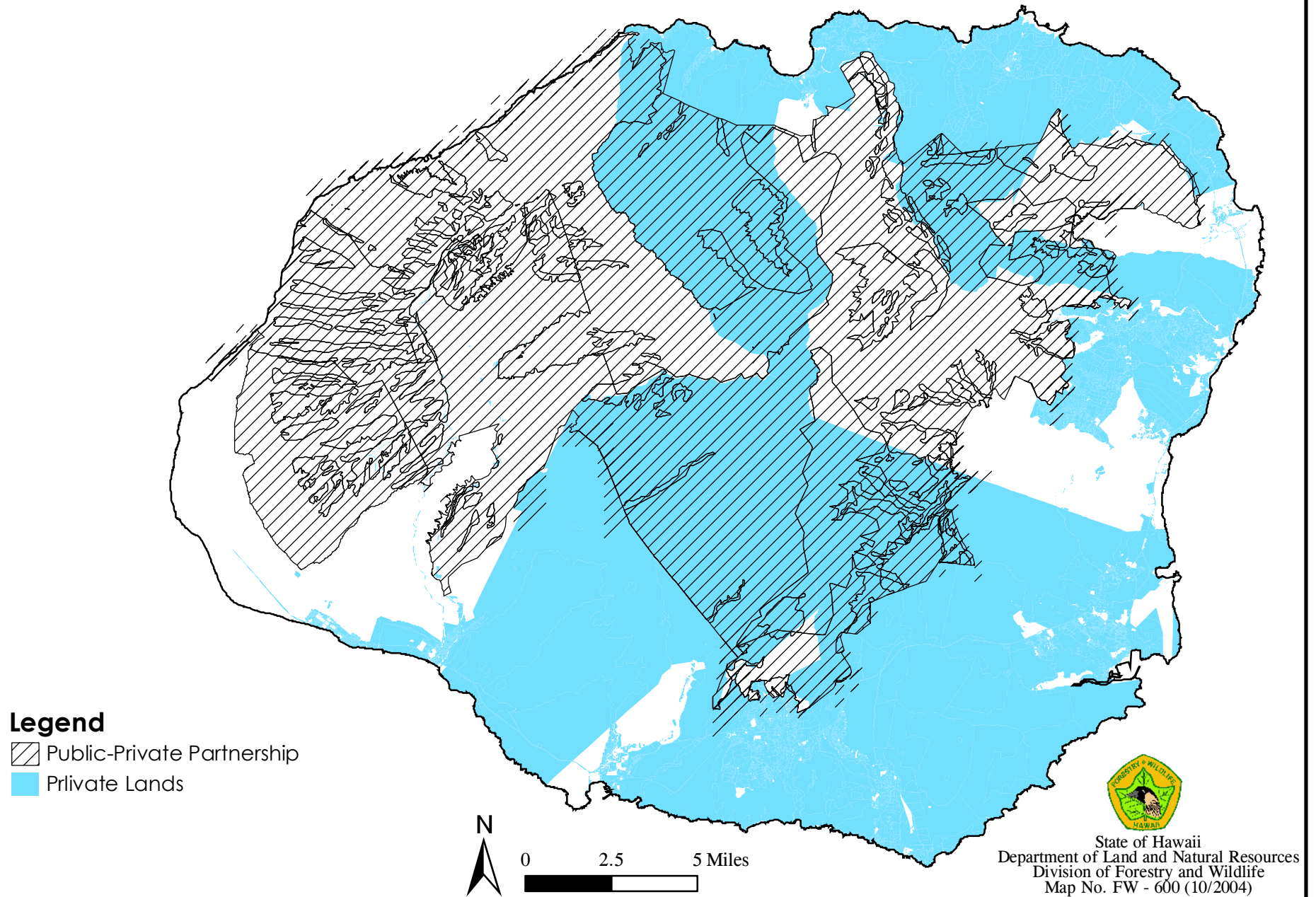


0 2.5 5 Miles



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0598 (10/2004)

Private Lands and Public-Private Partnership : Island of Kauai



7-4. Island of Lānaʻi

The Island of Lānaʻi is one of the smallest and least populated islands in the State. Lanaʻi has experienced severe watershed degradation due to land-use practices that once were dominated by pineapple production and cattle grazing, and are now focused on supporting tourism and increasing landowner development. Currently, approximately ninety five percent of Lānaʻi is held under the ownership of one landowner, which may help facilitate negotiation and strategic use of Forest Legacy funding in the watershed areas. Due to historic land use practices and increases in tourist and local populations, water continues to be a critical issue. A comprehensive water management plan was developed in the 1970's, and there are a number of State and Federal agencies working with the landowner(s) to protect upland forested areas. There is great potential for matching funds/land donations and partnerships on Lanaʻi.

Forest Legacy Area : Island of Lanai



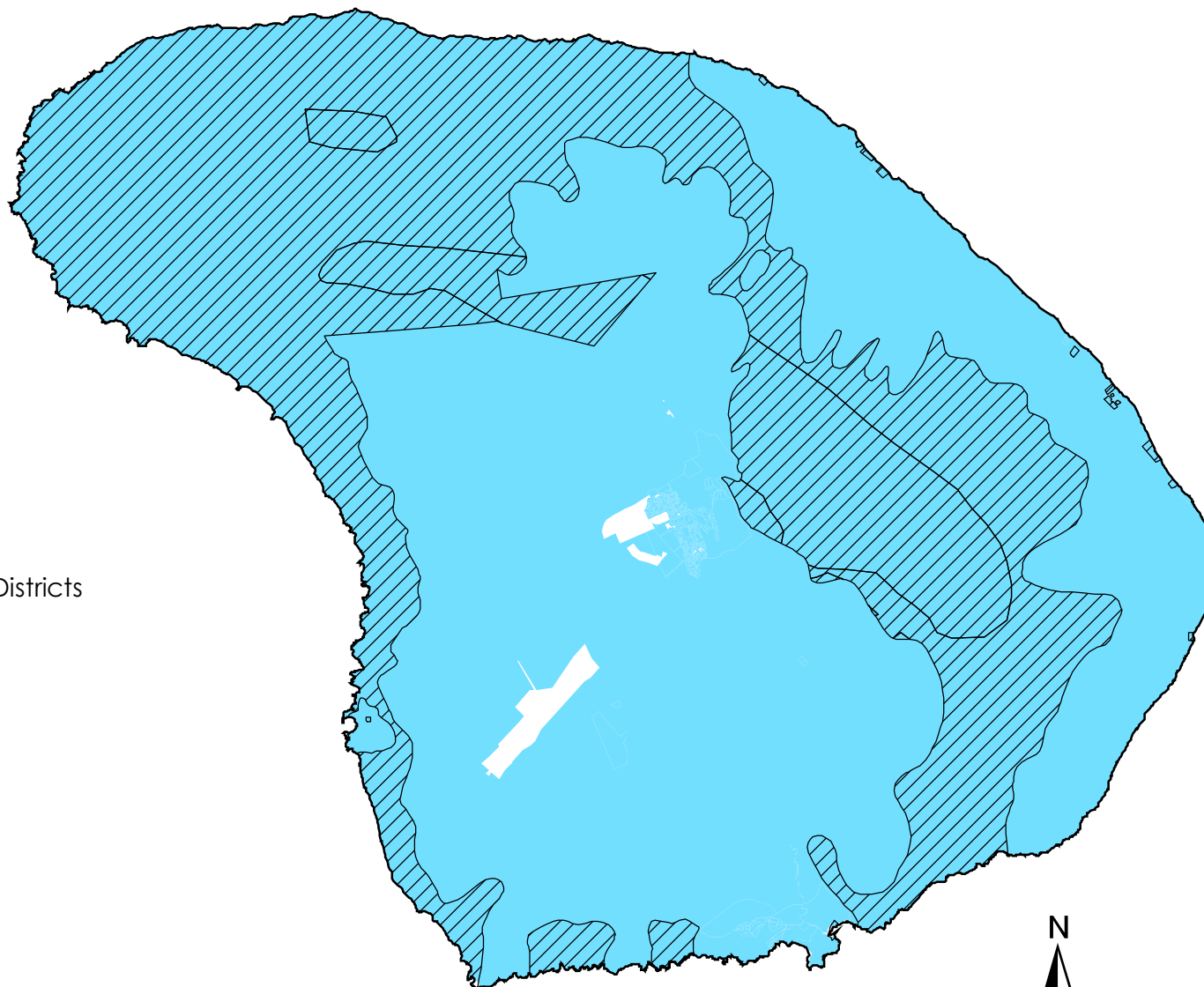
Private Lands and Conservation Districts : Island of Lanai

Legend

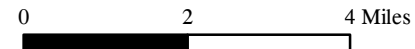
-  Conservation Districts
-  Private Lands



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0611 (10/2004)



0 2 4 Miles

A horizontal scale bar with three segments, labeled 0, 2, and 4 Miles.

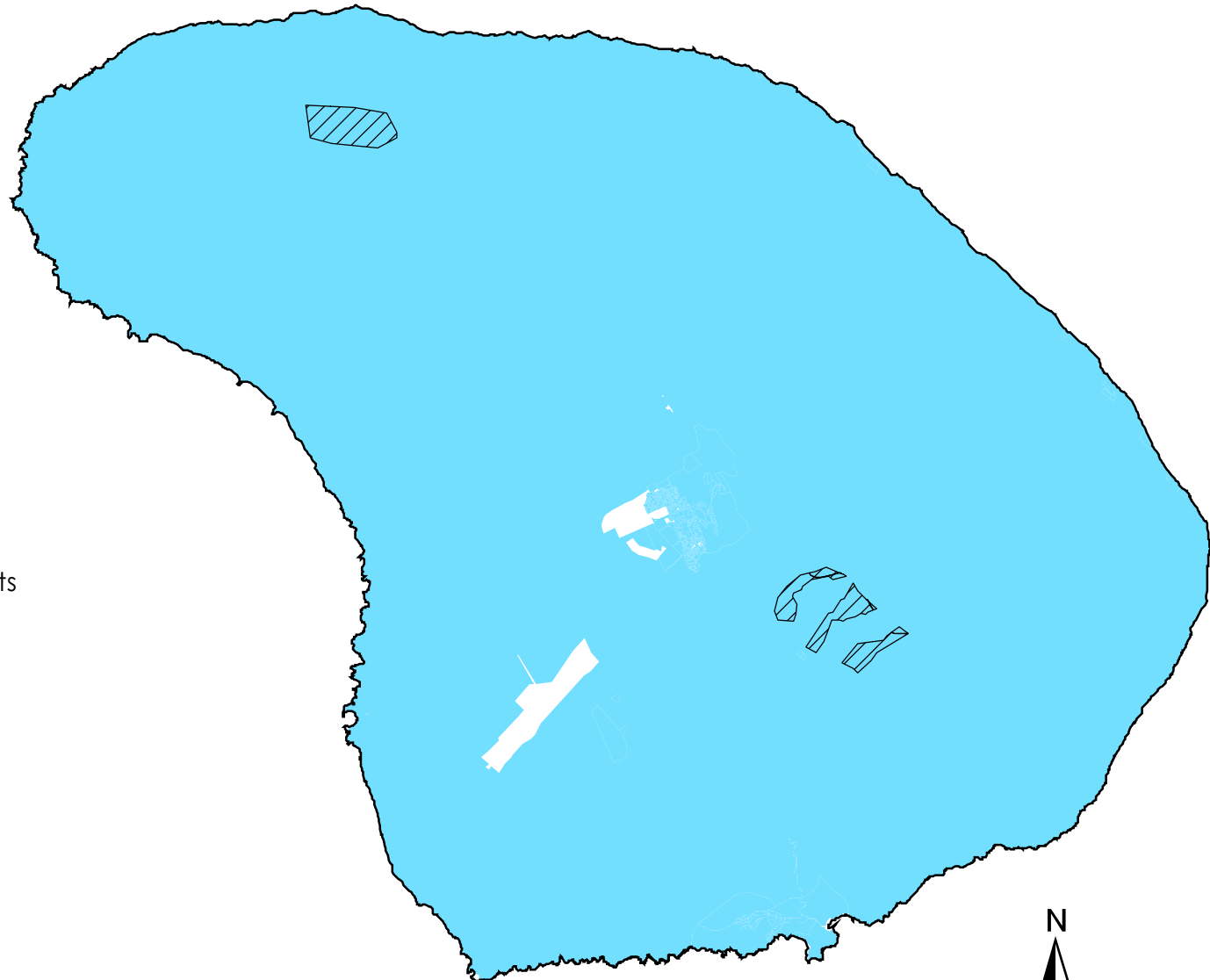
Private Lands and Critical Habitats : Island of Lanai

Legend


-  Critical Habitats
-  Private Lands



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0610 (10/2004)



0 2 4 Miles

A horizontal scale bar with a black segment on the left and a white segment on the right, marked with the numbers 0, 2, and 4 Miles.

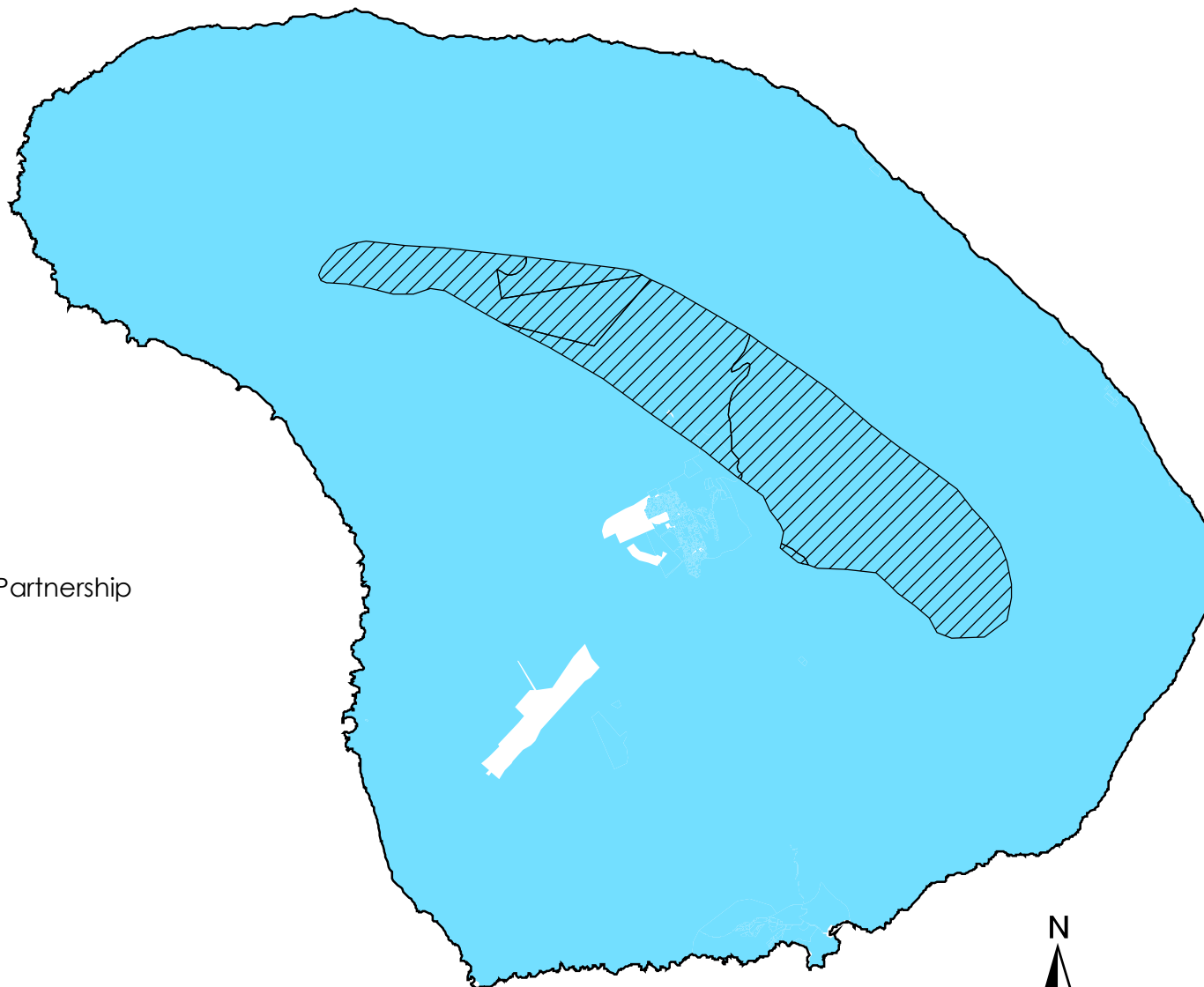
Private Lands and Public-Private Partnership : Island of Lanai

Legend


-  Public-Private Partnership
-  Private Lands



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0612 (10/2004)



0 2 4 Miles

A horizontal black scale bar with white markings at 0, 2, and 4 miles.

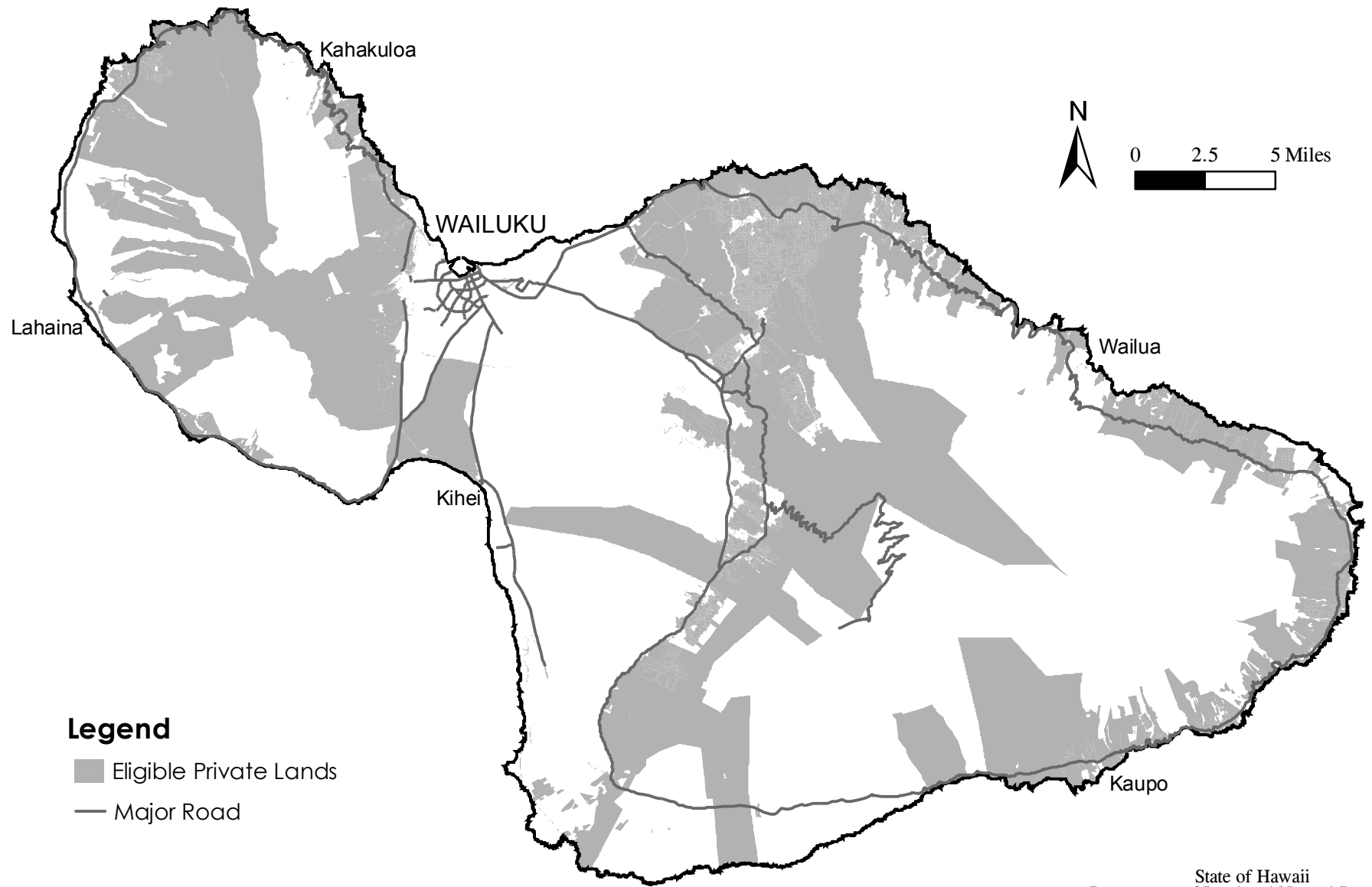
7-5. Island of Maui

The Island of Maui is undergoing rapid development and is faced with serious water shortage issues. Watershed quality is a crucial issue facing the island, and there has been recent funding approved at the county level for land purchases and protection that may help provide match for Forest Legacy funding.

One major area of emphasis that should be given attention by the FSC in the encouragement and selection of qualifying tracts on Maui is Auwahi-Kanaio. This entire area contains scattered native forest resources. The area above approximately 5,000 feet in elevation is primarily native vegetation with kikuyugrass (*Pennisetum clandestinum*) understory. This upper area contains no known rare plants or animals and is currently used primarily for cattle grazing. The area below approximately 5,000 feet elevation is primarily non-native but has three rare forest types, including the only known example of east Maui diverse montane mesic forest. There are also numerous rare plants, including *Meliocope adscendens*, the only known population of a unique kind of mahoe (*Alectryon macrococcus* var. *auwahiensis*), the only known population of a kuku`i (*Nototrichium humile*), and the best population of an `alani (*Melicope mucronulata*). Native spiders are endemic to the area, but the trees that the spiders live in are dying or dead.

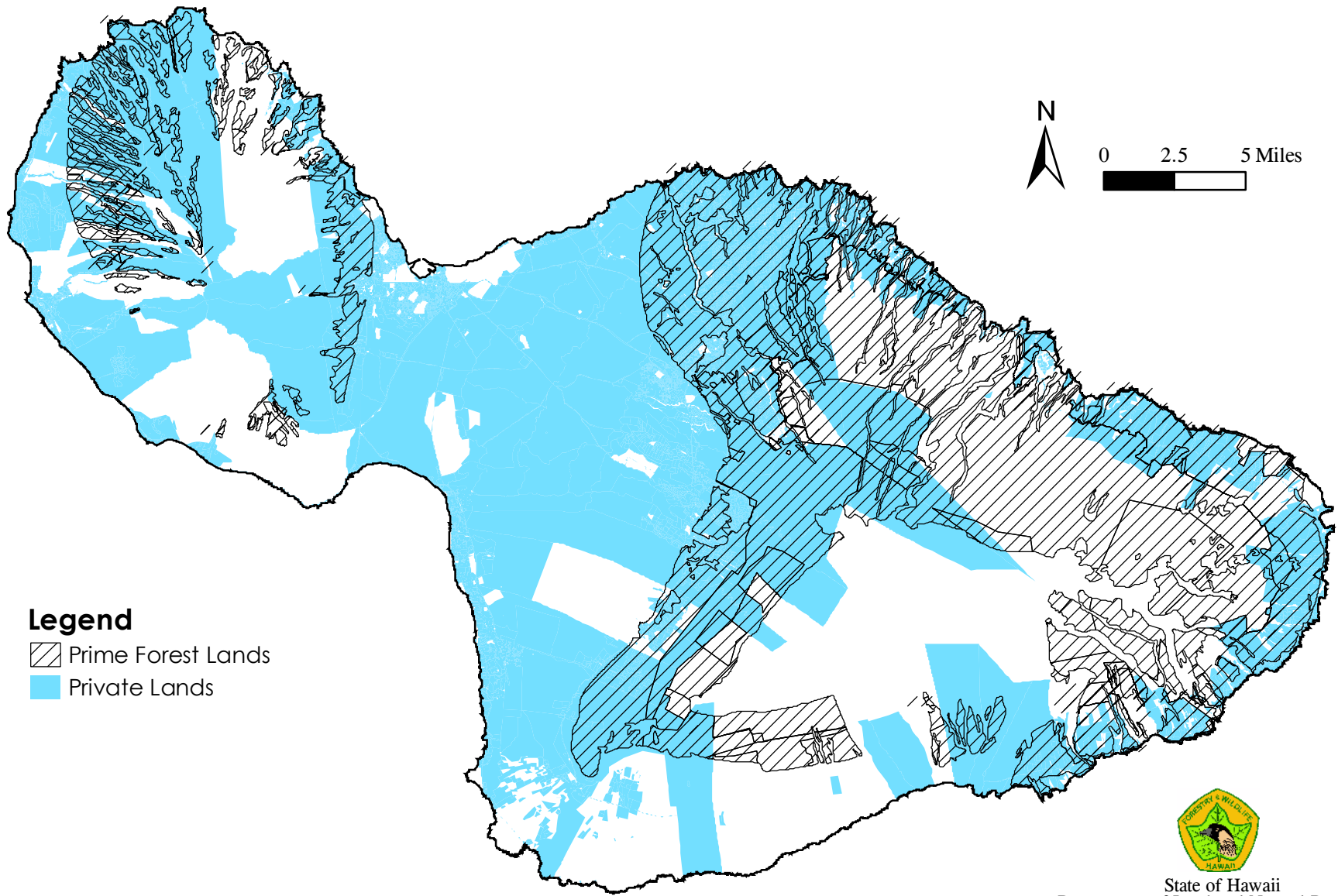
This site is an extension of the Kahikinui Forest Reserve and, with protection and some management, could extend habitat for native birds currently isolated in the Polipoli area. The removal of grazing pressures on this area, combined with sound forest management strategies, would also allow the re-establishment and expansion of the existing rare forest types. This would provide buffers and links to the Kanaio NAR. More survey work is needed to refine the boundaries. There are also important known archaeological sites, including caves, in the area.

Forest Legacy Area : Island of Maui



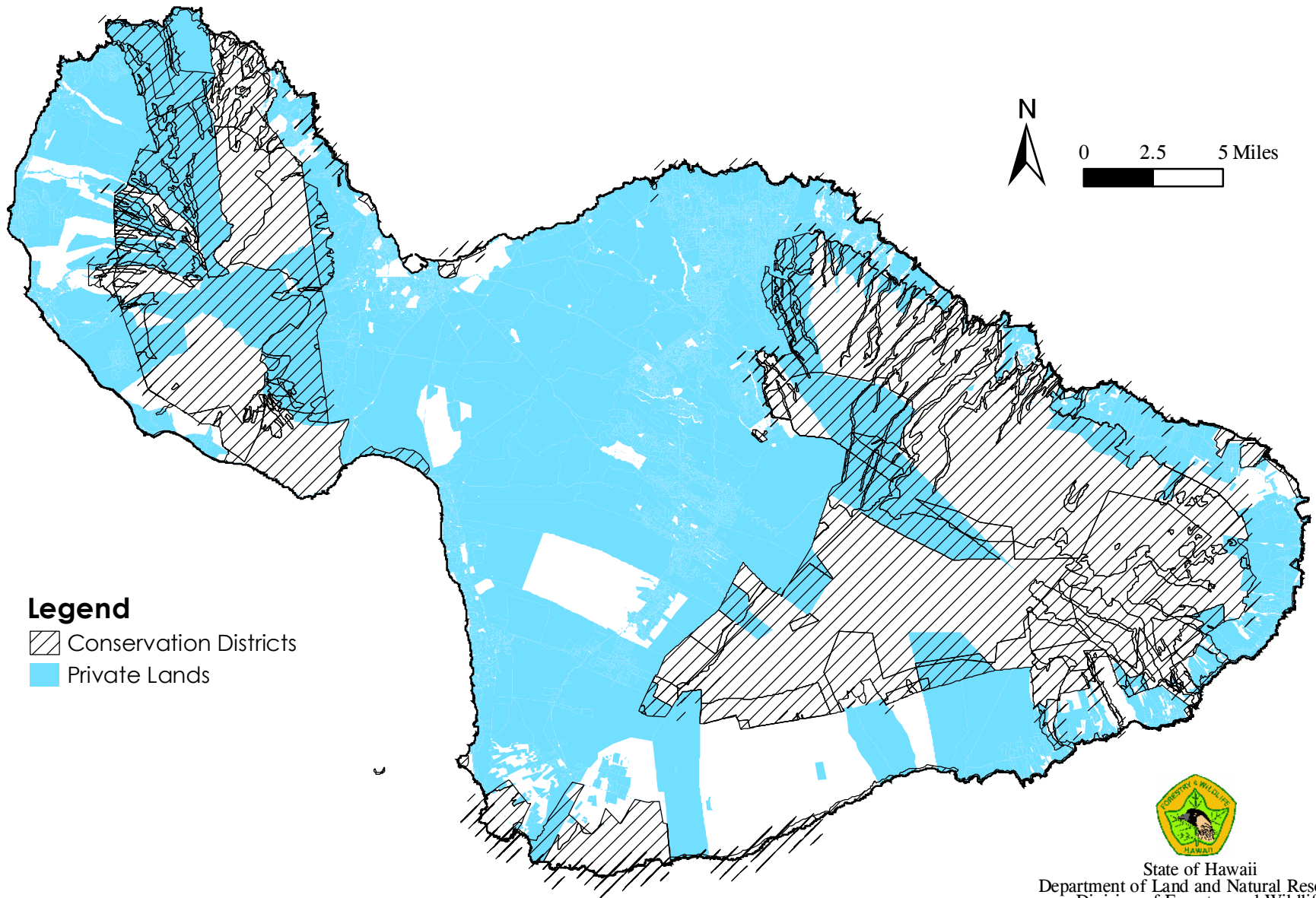
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0625 (10/2004)

Private Lands and Prime Forest Lands : Island of Maui



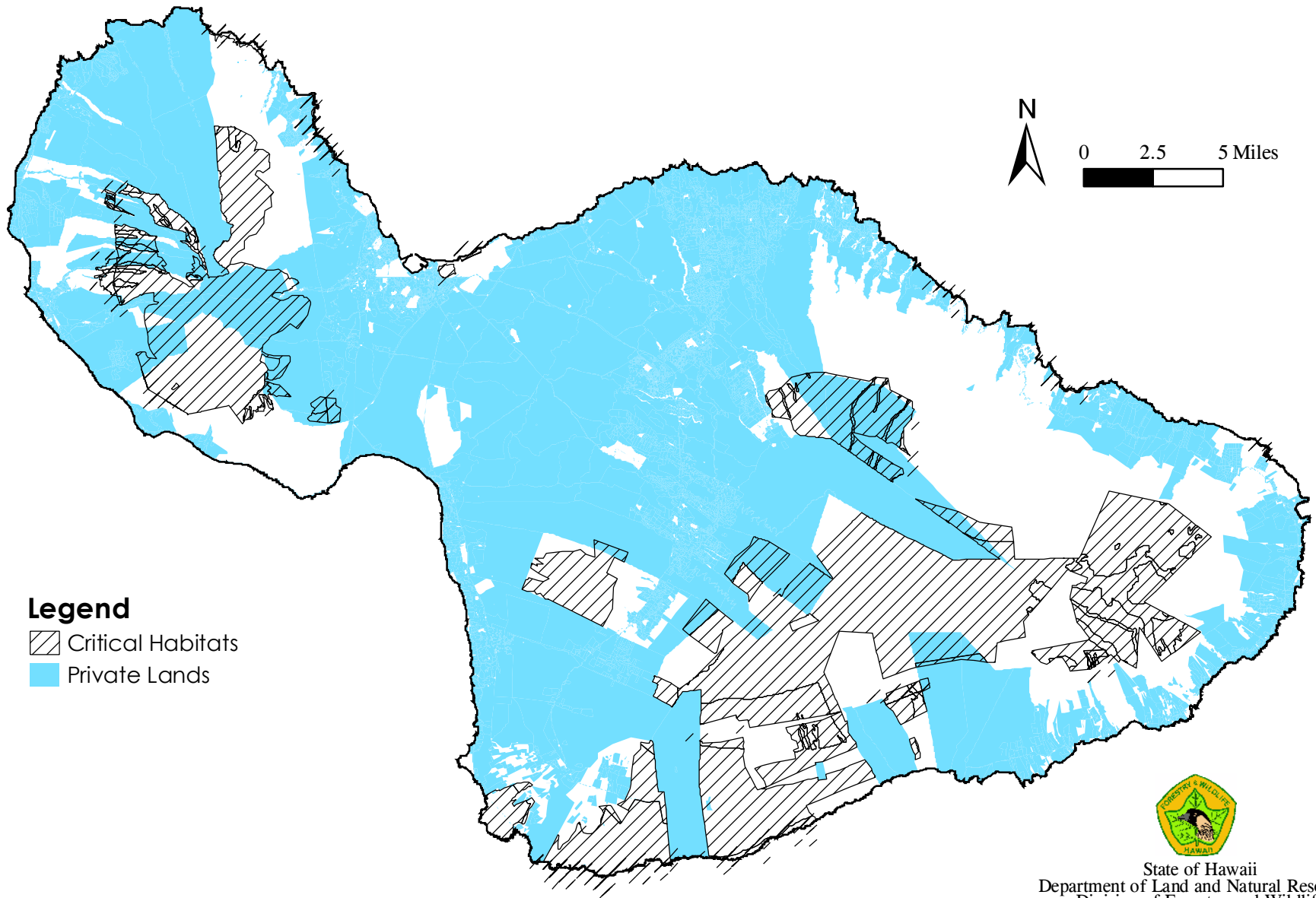
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0613 (10/2004)

Private Lands and Conservation Districts : Island of Maui



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0615 (10/2004)

Private Lands and Critical Habitats : Island of Maui



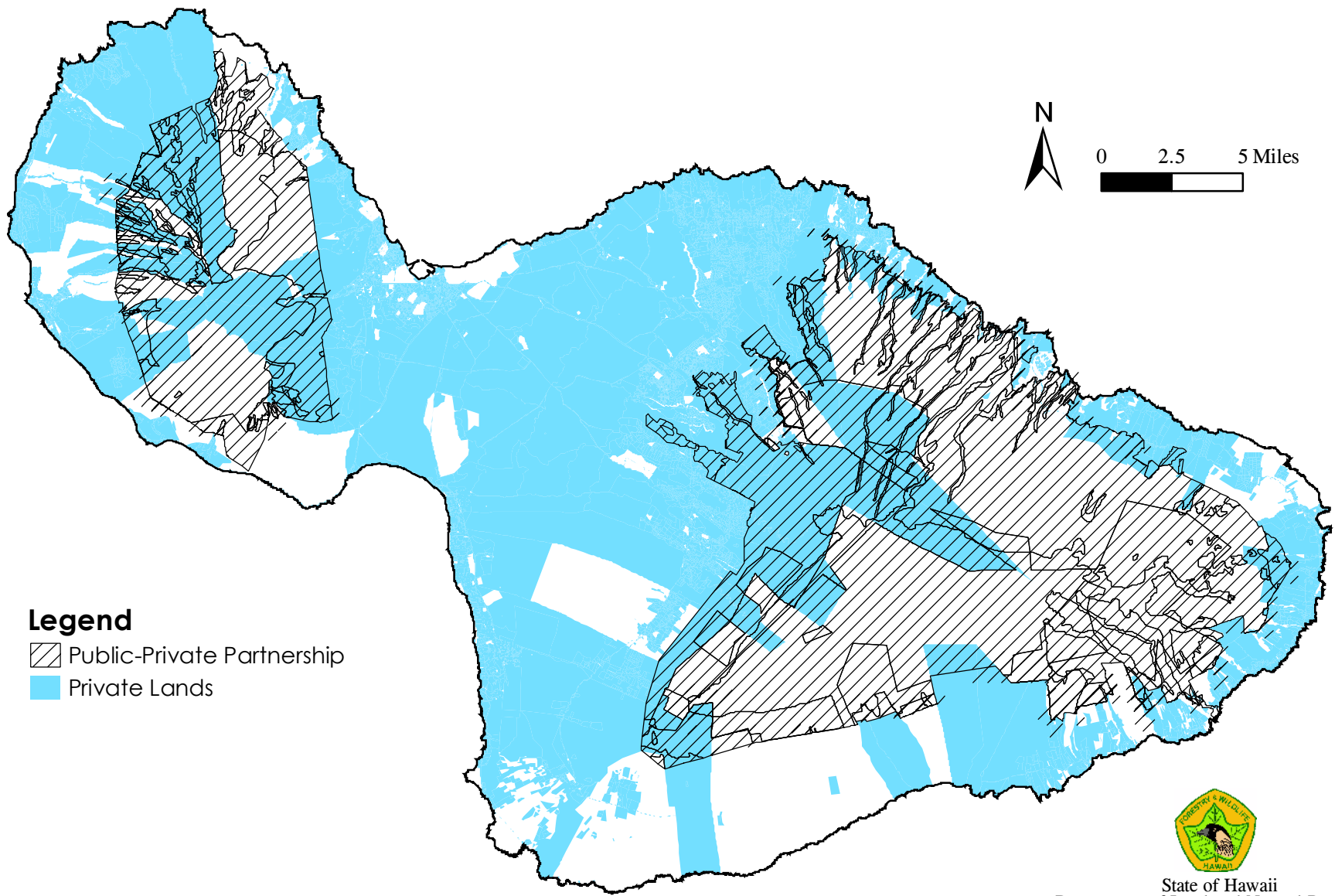
Legend

-  Critical Habitats
-  Private Lands



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0614 (10/2004)

Private Lands and Public-Private Partnership : Island of Maui



Legend

-  Public-Private Partnership
-  Private Lands



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0616 (10/2004)

7-6. Island of Moloka'i Sub-Unit

The Island of Moloka'i is relatively undeveloped and the threat of urban conversion of forest lands is small. However, the Island has serious watershed and run-off problems. Two areas of emphasis are of particular concern and should be given attention by the FSC qualifying tracts.

Kaunakakai Gulch

The first area of emphasis is Kaunakakai Gulch. Kahuaawi Gulch to Kapaakea Gulch from approximately 1,000 feet elevation up to the Molokai Forest Reserve boundary, on the south slopes of east Molokai. Although the ridge-tops are no longer dominated by native plants, there are large pockets of native vegetation in the gulches, including some sandalwood (*Santalum* spp.), wiliwili (*Erythrina sandwicensis*) and Koai'a (*Acacia Koaia*). The area is currently zoned agricultural and threatened by continued stress, degradation and fragmentation from grazing/pasture pressures.

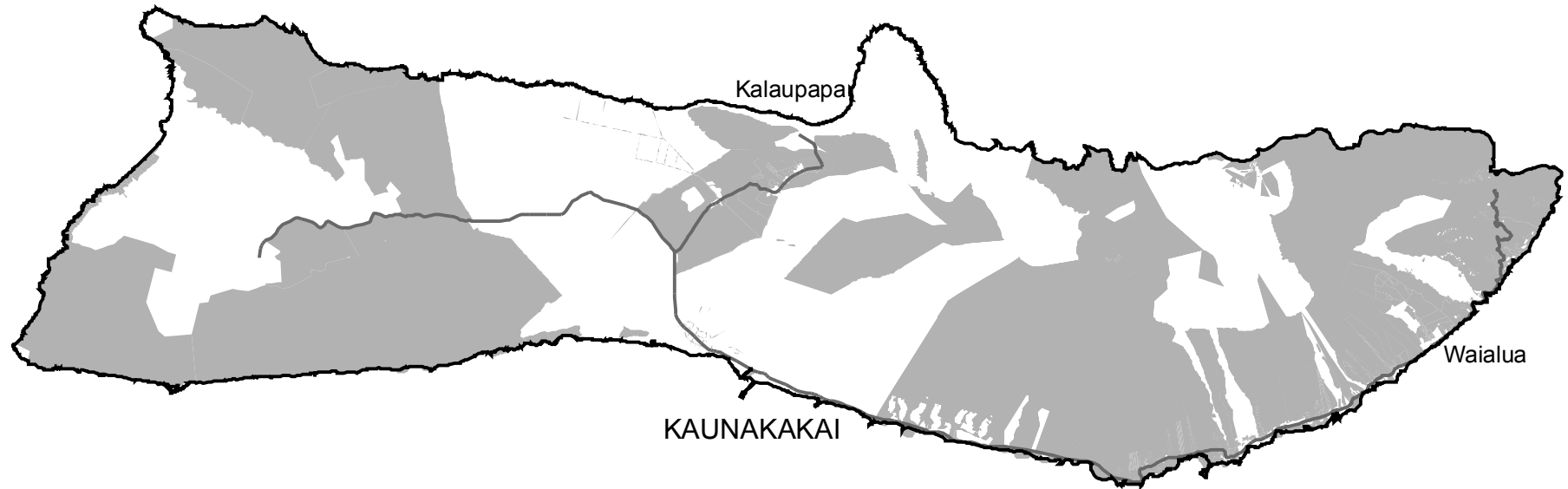
The acquisition of grazing rights to tracts within this area would remove grazing pressure and allow the existing fragmented native forest pockets to regenerate and spread into current pasture areas. The expansion and improved health of these native forests would provide additional native wildlife habitat, improve the watershed function of gulches, and decrease the soil erosion that currently pollutes coastal waters and near-shore reefs.

Kawela-Kamalo

The second area of emphasis is Kawela-Kamalo. Upper Kawela to Kamalo on the south slopes of east Molokai, from approximately 1,000 feet elevation up to the Molokai Forest Reserve boundary. This is a large section of currently grazed, agriculturally zoned land that contains pockets of intact native forest ecosystems and extends into the Conservation District from approximately 1,000 to 3,000 feet elevation in the eastern portion. The gulches contain native forests and shrub-lands, clusters of native plants and scattered populations of `ohai (*Sesbania tomentosa*). This area provides habitat for rare Achatinellid land snails (*Perdicella helenae*) and Kawela stream contains native gobies above 1,000 foot elevation.

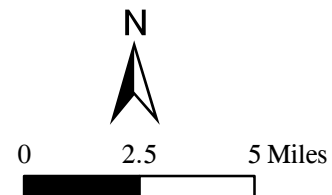
The acquisition of grazing rights on tracts within this area would remove grazing pressure and allow the existing fragmented native forest pockets to regenerate and spread into current pasture areas. The expansion and improved health of these native forests would provide additional and improved habitat for the endangered Achatinellid land snail and decrease sediment loading into the Kawela stream.

Lands Eligible for the Forest Legacy Program : Island of Molokai



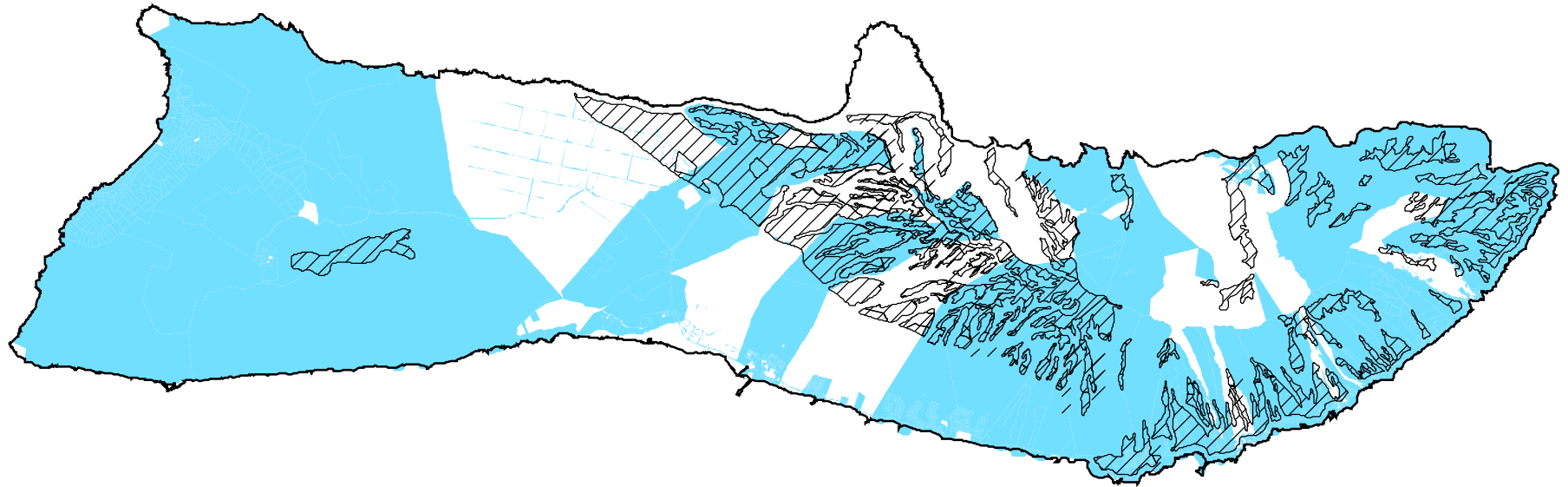
Legend

- Eligible Private Lands
- Major Road



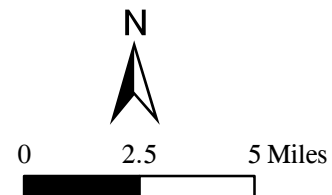
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0623 (10/2004)

Private Lands and Prime Forest Lands : Island of Molokai



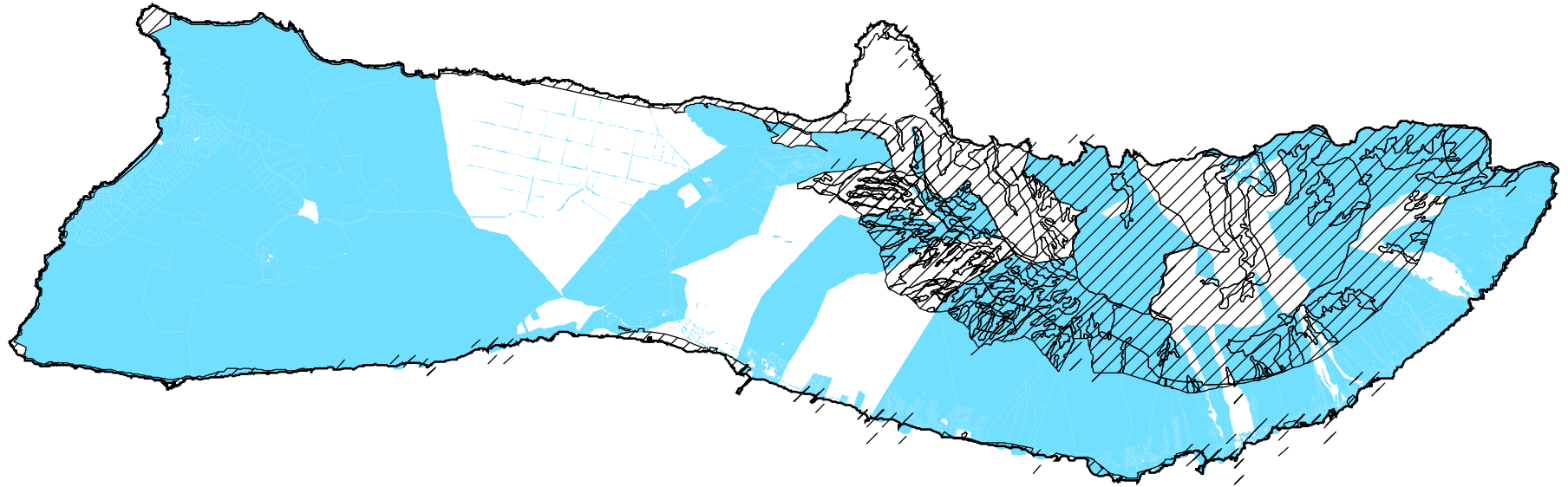
Legend

-  Prime Forest Lands
-  Private Lands



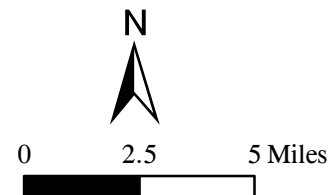
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0605 (10/2004)

Private Lands and Conservation Districts : Island of Molokai



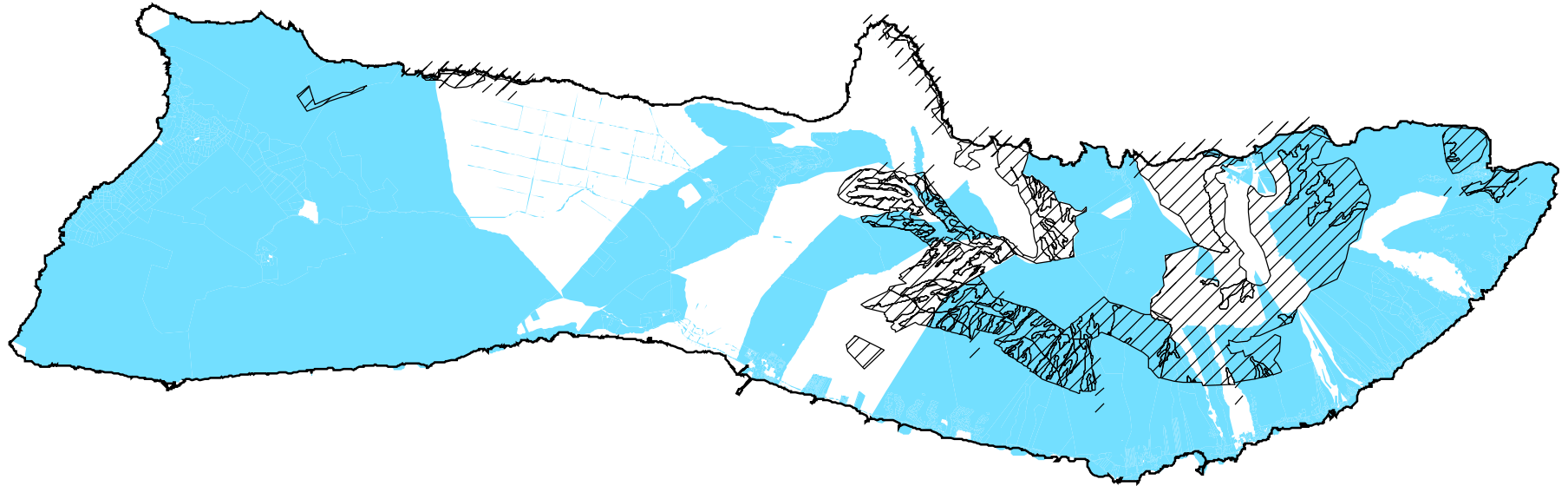
Legend

-  Conservation Districts
-  Private Lands



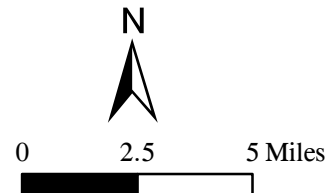
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0607 (10/2004)

Private Lands and Critical Habitats : Island of Molokai



Legend

-  Critical Habitats
-  Private Lands



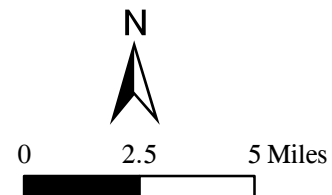
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0606 (10/2004)

Private Lands and Public-Private Partnership : Island of Molokai



Legend

-  Public-Private Partnership
-  Private Lands

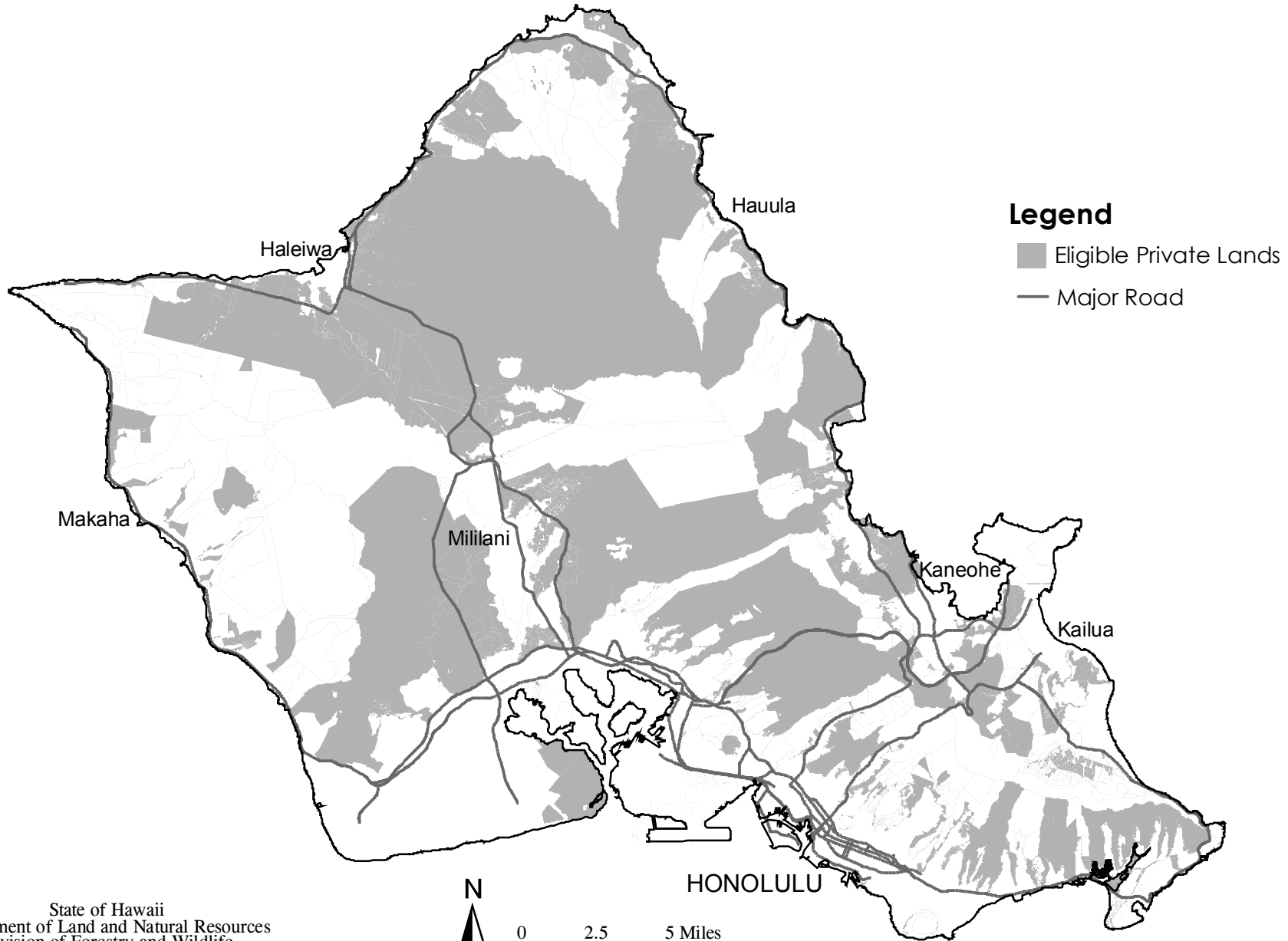


State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0608 (10/2004)

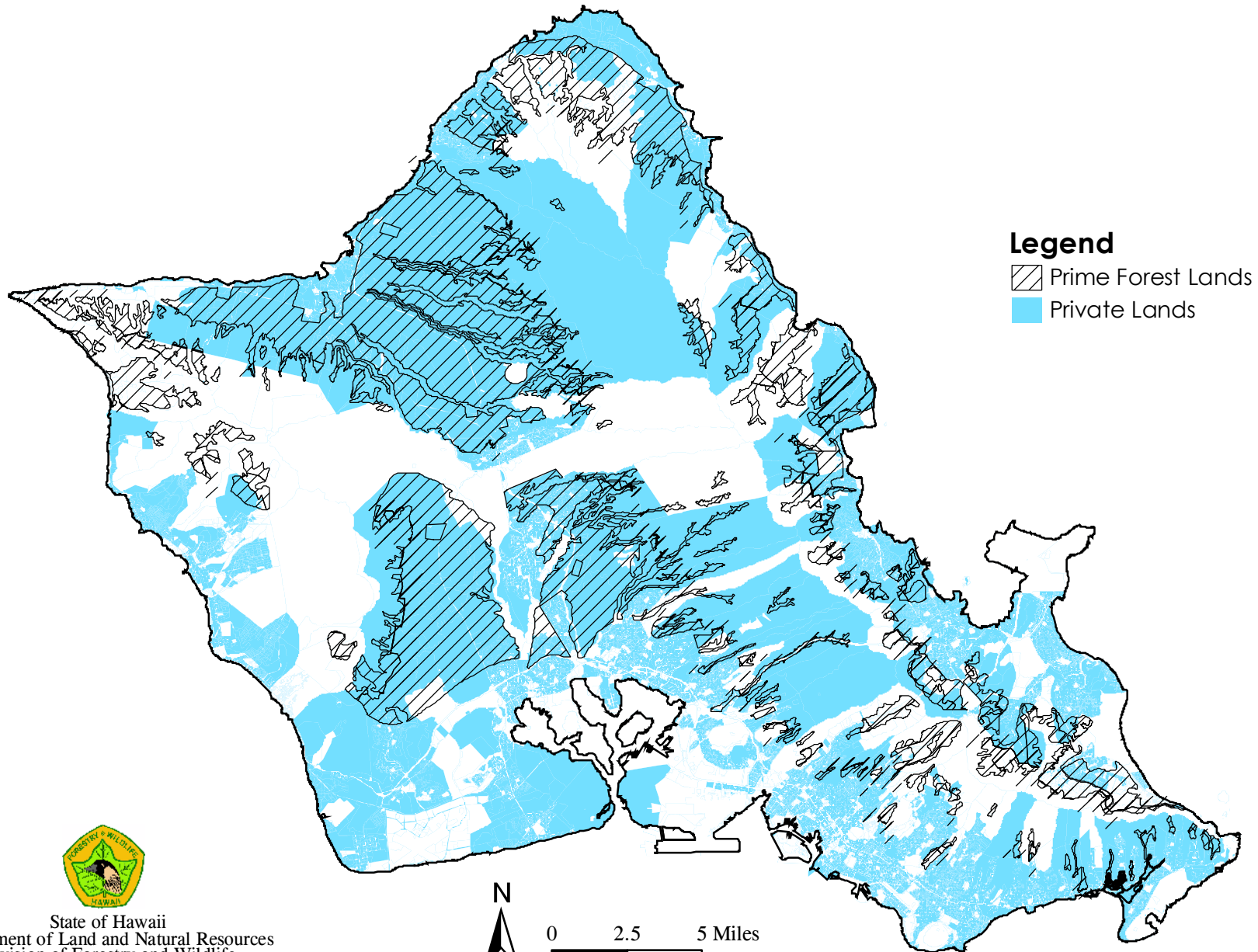
7-7. Island of O‘ahu

The Island of O‘ahu is the center of Hawai‘i’s population and urban development. As such, it’s forest resources have been impacted to a greater extent than any of the other islands. However, the island still retains large forest areas that continue to provide water recharge for the urban population and forest health is critical to this system. With increased cross-islands passes and ancillary roads penetrating all aspects of the island, invasive species are impacting what once were pure native forest stands. These changes in forest cover and deforestation in general due to huge human population increases are changing the islands water absorption capacity, recharge rates, number of streams, and fresh water marine systems. It is imperative that continued aggressive efforts are undertaken to protect the highly threatened forests from conversion to non-forest uses and invasive species, which are changing native species composition and abundance throughout O‘ahu.

Forest Legacy Area : Island of Oahu

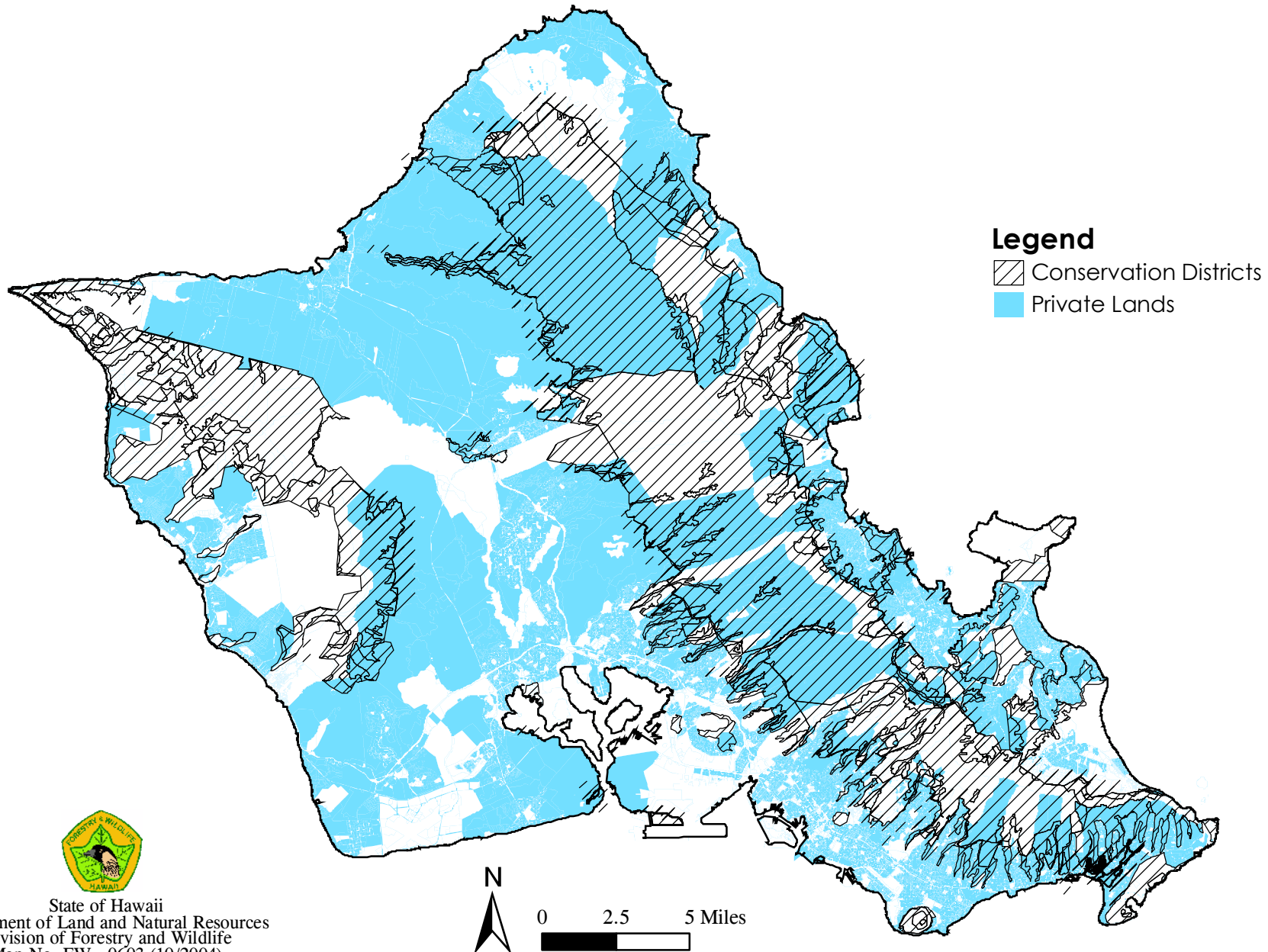


Private Lands and Prime Forest Lands : Island of Oahu



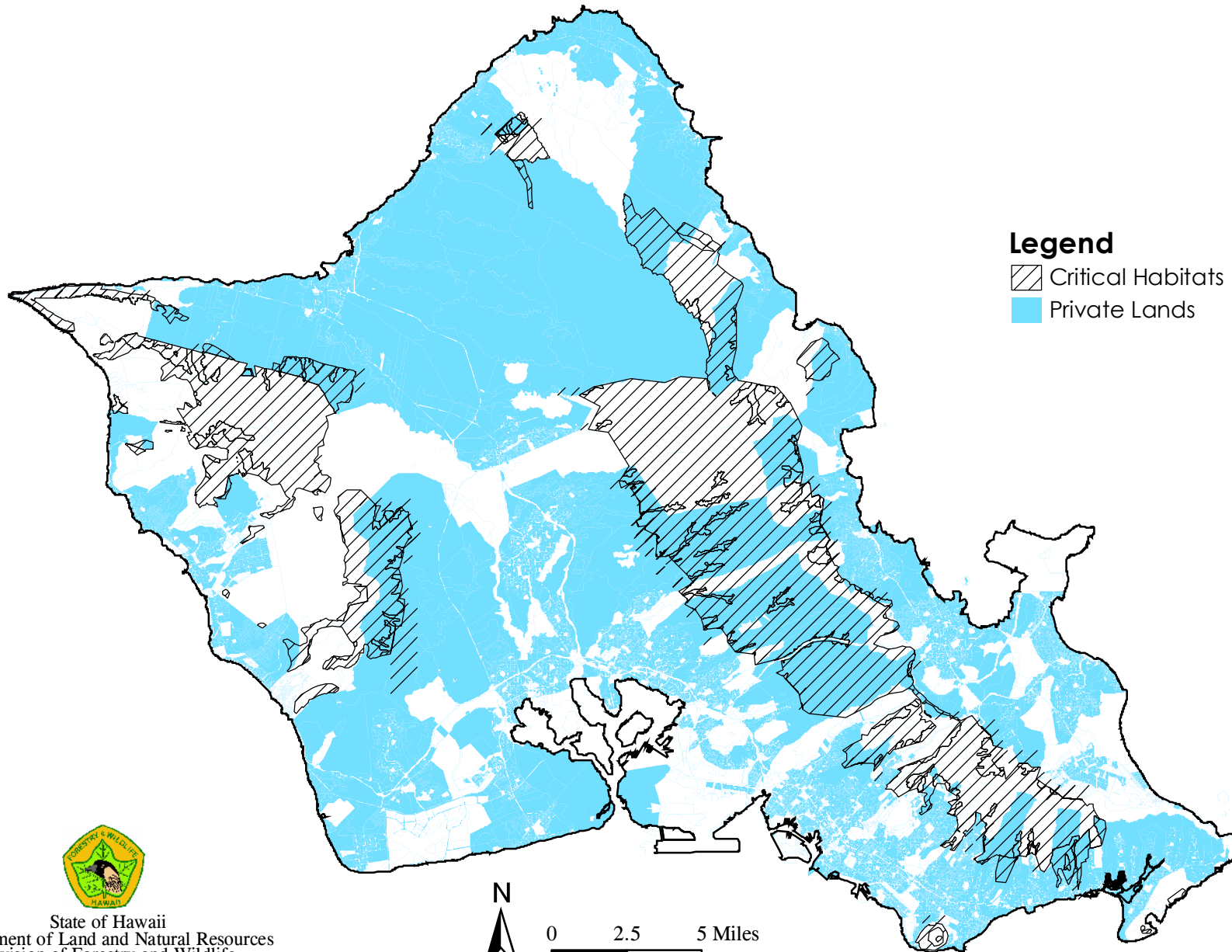
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0601 (10/2004)

Private Lands and Conservation Districts : Island of Oahu



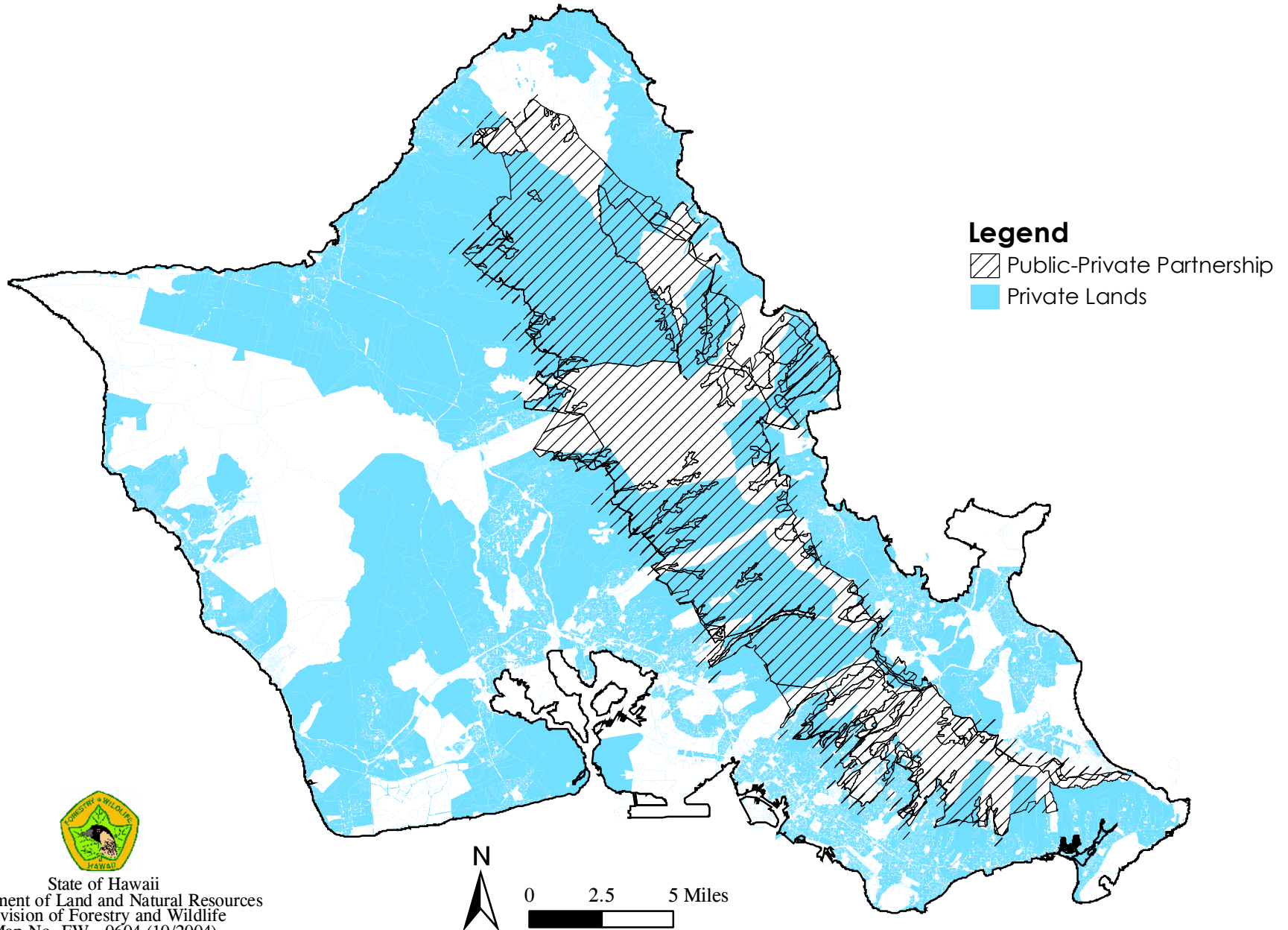
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0603 (10/2004)

Private Lands and Critical Habitats : Island of Oahu



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0602 (10/2004)

Private Lands and Public-Private Partnership : Island of Oahu



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0604 (10/2004)

Chapter 8

IMPLEMENTING PROGRAM GOALS AND OBJECTIVES AT TRACT LEVEL

8-1. Prioritization of Tracts

As outlined in Chapter 6-5, the Hawai'i Forest Legacy Areas are defined by meeting one or more of four basic criteria: 1) Private Lands Recognized as Prime Forest Lands; 2) Private lands that are included within the State of Hawai'i "Conservation" Land Use District; 3) Private lands that include critical habitat as defined by the USFWS; and, 4) Private lands that are part of a recognized Public-Private Watershed Partnership.

Meeting any of the above criteria will include an individual tract in the FLA and make it eligible for Forest Legacy Program funds. An individual tract that meets multiple criteria will have this fact taken into consideration. An individual tract located in one of the above "areas of emphasis" within the Island FLA sub-unit will also be taken into consideration. *However, DLNR-DOFAW will make final prioritization of individual tract applications from the State of Hawai'i Forest Legacy Area with advice from the Forest Stewardship Committee according to the criteria below.* Priority will likely be given to tract applications that reflect the national FLP selection criteria and also meet the greatest number goals and objectives below to the highest degree as determined by the FSC and DLNR-DOFAW staff. Because watershed/hydrologic functions are viewed by the public as the most important forest value, this criteria and its importance as defined by the characteristics below, will be weighted most heavily. Prioritization will have to be carried out on a case by case bases, and various criteria also weighed in consideration of local concerns and other case specific factors.

8-2. Important forest uses and values. Areas will be evaluated on the degree to which they provide one or more of the following important forest values:

i. Important watershed/hydrologic function as determined by:

- > Total recharge capability.
- > Local need for more watershed protection.
- > Condition and composition of vegetative cover.
- > Total area of defined land unit.
- > Potential for fog drip input.
- > Need for re-planting/forest regeneration.
- > Forest recovery potential if badly degraded.
- > Area exists within an important watershed.

- > Area exists within a Watershed Partnership Area.
- > Area is large enough to represent significant watershed recharge volume.

ii. **Wildlife habitat**

- > Area contains unique wildlife or freshwater fish habitat and/or other ecologically recognized criteria.
- > Area includes connective habitats, corridors, habitat linkages and other areas that reduce biological isolation.
- > Area contains any of a number of native or threatened and endangered wildlife and/or fish species.

iii. **Native plants**

- > Area contains species endemic to the Hawaiian Islands.
- > Area contains species native to the Hawaiian Islands.

iv. **Threatened and Endangered Species**

- > Area is known to contain one or more threatened and endangered species.
- > Area is known to provide threatened and endangered species habitat.

v. **Public recreational opportunities**

- > Trail based and/or day use recreational opportunities exist such as hiking, nature study, picnicking or horseback riding.
- > Natural resource recreational opportunities are available-camping, nature touring, etc.
- > Adjacent land is utilized recreationally by public.

vi. **Public hunting opportunities**

- > Area has significant game bird or mammal populations.
- > Reduction of game animal populations will benefit native species.

vii. **Known cultural and/or historic areas**

- > Area contains recorded archeological site.
- > Area includes other noted historic features.
- > Area provides land utilized for traditional gathering and other customary cultural practices.

- > Area includes important cultural sites, features recognized by cultural practitioners.

viii. Other ecological values

An area may exhibit other exceptional ecological conditions that are important and add to the quality of the proposed Forest Legacy Area such as:

- > Area provides a mix of ecological communities (biodiversity).
- > Area includes ecological communities that are becoming rare in Hawai'i such as relatively intact native forests.
- > Area provides important source of seeds/reforestation for native plants and trees for adjacent land areas.

ix. Opportunities for continuation of traditional income-producing forest uses.

Maintaining traditional forest uses is important in a Forest Legacy area in that it enables the conserved or protected forest to provide social and economic benefit and not serve simply as a drain on private and public financial resources. Positive factors that reinforce this include:

- > Area will remain available for timber production without seriously compromising other values.
- > Area will remain available for gathering of non-timber products.
- > Protection of area will preserve other economic activity in region.
- > Area will be accessible to public hunting.

x. Regional values

With careful selection and planning, Forest Legacy Areas can provide units that have regional, not just local significance. The features and functions of these units should include:

- > Linkages for recreational values, such as trails, especially along rivers, mountain ridges and parcels that connect existing publicly-owned lands.
- > Area is contiguous with other lands already in protected status.
- > Public or private drinking water supply protection.
- > Scenic qualities having their basis in the traditional Hawai'i natural and cultural landscape, including areas that contribute to scenic tourism and eco-tourism economies.

- > Connective habitats or corridors for wildlife.

xi. **Scenic resources**

- > Area is within view of a heavily utilized roadway
- > Tract is within the viewshed of a populated urban or residential area
- > Tract is regularly viewed by recreational users
- > Tract is considered a scenic resource as part of tourism or other uses

xii. **Potential for forest restoration/regeneration**

In Hawai'i, gradual conversion to "non-forest" use through long-term grazing is at least as destructive as is conversion to urban uses. Conversion by grazing can be reversed much more easily if grazing is discontinued before the last native vegetation, including tree seed banks is lost. Similarly, gradual conversion to a forest dominated by invasive species can drastically reduce the quality of watershed areas and can be reversed if such incursions of invasive plants are addressed while populations are still relatively small.

- > Area can be effectively protected from fire and grazing.
- > Area can be effectively protected from incipient incursions of invasive species.
- > Area would have significant value for watershed, wildlife, threatened and endangered species or traditional forest uses if protected, restored or regenerated.

8-3. Type and level of threat by conversion to non-forest uses. There are various kinds and degrees of threat by conversion to valuable contiguous forest areas, such as encroaching housing or resort development, subdivision, road construction and utility extensions. In determining the degree of threat to an area, DLNR-DOFAW will consider the following as requiring immediate action:

- i. Area is situated in close proximity to existing development.
- ii. Property value reflects areas potential developed uses.
- iii. Area may remain wooded, but will become further fragmented.
- iv. Area is currently on open market or listed by realtors.
- v. Area is in danger of being over-harvested.
- vi. Area is in state of rapid decline due to lack of management, overgrazing by game animals and/or invasion by exotic weeds.
- vii. Area is in the Agricultural or Rural District and likely to degrade due to current uses such as forest grazing.

8-4. Tract readiness and potential for partnership in management. Even if a forested area is threatened by conversion to a non-forest use, protecting it under the forest Legacy Program can only be accomplished if certain conditions exist which favor implementation. In determining the prospects for a successful effort under the Program, DLNR-DOFAW will consider the following:

- i. Area is owned by willing sellers (required).
- ii. Owner(s) understand conservation restriction/easement concept.
- iii. Owner is willing and interested to develop and carry out a Forest Stewardship management plan-or a comprehensive multi-resource management plan already exists for the area.
- iv. Owner intends that forest continue to provide for traditional uses.
- v. A 25 percent cost share match is available.
- vi. Area is available at below fair market value (bargain).
- vii. Other government or agency partners are interested in providing management support.

8-5. Additional Forest Legacy Area Nominations

Forest Legacy Area nomination is a brief written narrative utilizing elements in the "Basic Criteria" listed below and as in the executive summary format contained in appendix E. Other pertinent items may be included, but the points listed under basic criteria (below) must be included.

1. Designation Requirements for Forest Legacy Areas (Basic Criteria)

For an area to receive a Forest Legacy designation, the following are required:

- > Designation of each geographic area on a map.
- > Description of each important forest area and function.
- > A summary of important environmental values and how they will be protected and conserved in each Forest Legacy area.
- > A list of public values that will be derived through the establishment of each Forest Legacy area.
- > Documentation and analysis of the public involvement process.

Chapter 9

PUBLIC SENSING AND PARTICIPATION

9-1. 1994 AON Public Participation

The State Land Use District Boundary Review (SLUDBR) process described in Chapter 6-2 provided a number of opportunities for public input and comment concerning the proposed Forest Legacy Program and relevant issues in the areas currently targeted, namely the North Kona and South Kohala Districts of Hawai'i County. Information meetings, round-table discussions and workshops involving all concerned, presented the most current information on watersheds, natural resources, regulations and management strategies covering upland forest areas in these Districts. These activities built a common base of knowledge among the participants regarding watershed and natural resource issues. Discussions also examined forest values and a gamut of protection tools including district re-classification, cost sharing, tax incentives and conservation easements.

The workshop series was well attended by all concerned public and provided a useful forum for dissemination of specific information on the Forest Legacy Program. A total of 558 people attended the workshop series representing state and local government, forest and agricultural industries, environmental groups, land trusts, universities and schools, landowners and landowner associations, land use planners, native Hawaiian groups, homeowners and citizen planning groups. At the second workshop, held on July 1, 1993, a detailed packet on the Forest Legacy Program was distributed to all attendees. At the third workshop on July 12, 1993, the Administrator of the State Division of Forestry and Wildlife gave a presentation on incentive programs including a discussion of Forest Legacy. A detailed packet on the Program was again distributed.

Larger segments of the public throughout the State were contacted regarding Forest Legacy at regularly scheduled and special meetings, through mailings, and during telephone conversations. All of the responses to the initial sensing were positive or strongly positive with only one response considered to be "qualified". Notably, President and Executive Director of the Hawai'i Forest Industry Association, which represents landowners, harvesters and marketers of wood products expressed their personal support. The Hawai'i Chapter of the Society of American Foresters, the Audubon Society and the Sierra Club Legal Defense Fund all expressed their support as institutions. These contacts are summarized in the appendix.

A press release, containing information on Forest Legacy and requesting public comment was sent to all general circulation newspapers. A copy of the press release and one subsequent newspaper article can be found in the appendix.

After the above initial public sensing, DLNR-DOFAW circulated five press releases, three newsletter articles and an informational brochure in order to inform the public about the Program and solicit comment. Press releases were printed in the *Hawaii Tribune Herald* (3), *West Hawaii Today* (3), and the *Maui News* (2). Articles appeared in the Hawaii Forest Industry Association newsletter, *Woods*, in the DLNR-DOFAW newsletter, *Hawaii's Forests and Wildlife*, and in the DLNR newsletter *Resource*. Copies of these materials are contained in the appendix.

The Division also addressed approximately 300 personal letters directly to possible landowner participants, government officials and State agency staff. All responses to these mailings were positive, in support of the Program, with one exception. One landowner felt strongly that the perpetual nature of easements, regardless of the nature of rights transferred, is unacceptable. Copies of these letters, and written responses, are contained in the appendix. Most responses to the mailings, approximately thirty, were telephone calls--all in support of the Program. Three calls came from landowners who were immediately interested in enrolling in the program.

Three different drafts of this Assessment of Need were circulated to various State agency staff and all State Forest Stewardship Coordinating Committee members--and made available to the general public through mailings, news releases and public information meetings. All comments and recommendations received were considered and incorporated, where appropriate, in the final 1994 AON.

In August of 1994, DLNR-DOFAW held two public information meetings in the proposed Forest Legacy Areas--Kona and Kohala on the island of Hawai'i. Several large landowners in these areas attended the meetings and many expressed their interest in the Program.

Public comment received during the original public sensing process centered repeatedly on the protection of landowner rights and three related issues. These issues are summarized and addressed briefly below:

- 1) **Perpetual nature of easements:** Some landowners found the perpetual nature of Forest Legacy easement to be unacceptable and in violation of private property rights. This position is consistent with an almost universal perception by Hawaii landowners, that any government action will result in further regulation and land use restriction. All informational materials distributed, and meetings held, emphasized the strictly voluntary nature of the Forest Legacy Program and its support for the traditional uses of forests such as timber management. The elimination of phrases such as "forest protection" and "forest

preservation" from this document and a stronger emphasis on the "working forest" objectives promoted by the Program made the perpetual nature of easements a bit more acceptable to some landowners involved in this process.

- 2) **Tax implications:** As explained in Chapter 4-2, the current tax structure in Hawai'i encourages the clearing of forest land, most often because grazing lands receive the lowest tax rate. Landowners who contacted DLNR-DOFAW about the Forest Legacy Program wanted to know how the transfer of an easement would affect their property taxes. DLNR-DOFAW explained that when the federal government purchases an interest in a piece of property, the fair market value of that property--and thus its assessed value for tax purposes--may be reduced. Ultimately, however, property tax outcomes will depend on decisions made at the County level. DLNR-DOFAW is in no position to advise landowners of probable tax implications.
- 3) **Easement stipulations concerning federal government's future use of acquired rights:** Landowners interested in the Program are those who want to ensure that traditional forest uses will be maintained in perpetuity on their properties. Without exception, landowners contacted indicated that easement language would have to preclude the future use of transferred rights by the federal government, if that use of rights were to in any way threaten the integrity of the forest resources originally managed under the program. DLNR-DOFAW agreed that this was an important Program consideration and has worked with the concerned landowners and the Forest Service to address this in easement language.

9-2. 2004 AON Amendment Public Participation

In order to ensure that proposed amendments to the State of Hawai'i Assessment of Need were made available to the public for comment, DLNR-DOFAW took several steps to allow and invite participation and feedback from concerned groups, individuals, and the public at large. These include:

- 1) **Regular Public Meetings Held State-Wide.** The state body responsible for amendments to the Assessment of Need is the Forest Stewardship Committee (FSC). FSC meetings are open to the public and held on different islands in Hawai'i on a rotating basis, allowing increased availability to address forest issues on each island. The plan of amending the State of Hawai'i AON was first introduced at the July 12, 2002 FSC meeting in Hilo, Hawai'i by DLNR-DOFAW Administrator Karl Dalla

Rosa. The FSC supported the plan as reflected in the public meeting minutes and the amendment process has regularly been on the FSC agenda since 2002. Since the date of introduction, nine public FSC meetings have been held on various islands including O'ahu, Kaua'i, Hawai'i, and Moloka'i.

- 2) **Targeted Letter Seeking Comment to Concerned Groups.** In September 2004, DLNR-DOFAW produced a rough draft of the amended AON. A letter requesting public comment was sent out to the original list of interested individuals and organizations contacted for the original AON public comment section in 1994. In addition to these letters (numbering over 100), letters were also sent to additional groups in the DLNR-DOFAW Forest Stewardship Coordinator database gathered since the original publication of the AON. These letters announced two upcoming public meetings regarding the proposed amendments to the AON, and alerted interested parties that the proposed maps delineating amended Forest Legacy Areas were available for public viewing and comment on the DOFAW website.
- 3) **Maps Posted Publicly on Internet.** Maps of the proposed amended Forest Legacy Areas were posted to the public DOFAW website on September 17, 2004 and remained available to the public through the full comment period (November 1, 2004). The public was alerted to this posting through letters to target groups, and public notice in local newspapers.
- 4) **Specific Public Meetings Held.** Two public meetings were announced and held on the two islands where the majority of public interest and comment in the Forest Legacy Program had been generated during the original creation of the AON. On September 23, the FSC held a meeting open to the public in Hilo, Hawai'i where the draft amendments to the AON were publicly discussed and tentatively adopted. On October 6, the FSC sub-committee held another open meeting for the public in Honolulu, O'ahu where further public comments were accepted.
- 5) **Public Newspaper Notice.** Public notice of the proposed amendments to the AON was posted in the official state of Hawai'i newspaper of record (Honolulu Star-Bulletin). The notice directed the public to the website showing revised maps for Forest Legacy areas, and also notified the public of the October 6 public meeting regarding AON amendments held at Department of Land and Natural Resources building in Honolulu.

- 6) **Government Representatives.** The offices of Hawai'i's two Senators and two Congressional Representatives were briefed on the amendment process and invited to review the amended AON. The entire Hawai'i delegation has completed a review of the document and expressed unanimous support for the amended AON and stands ready to write individual letters of support for the adoption of this proposed AON.

All comments from the public and interested groups were included in the appendix of the Amended AON. Please contact Sheri Mann at Sheri.S.Mann@hawaii.gov if you would like a copy of the appendix.